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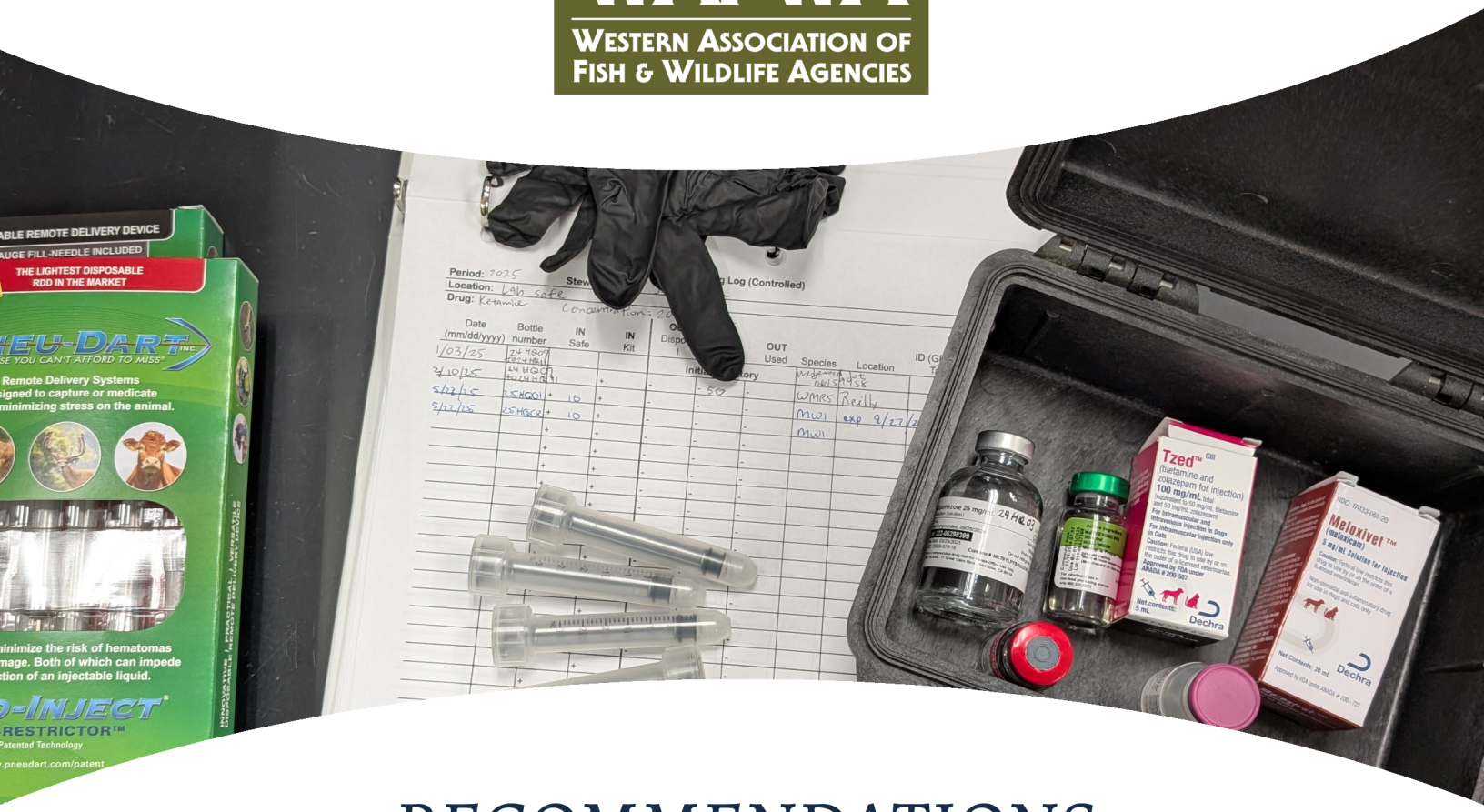

RECOMMENDATIONS

for the Purchase, Distribution, Use, and Disposal of Pharmaceuticals Used in Wildlife for

WILDLIFE MANAGEMENT AGENCIES

A PRODUCT OF THE WAFWA WILDLIFE HEALTH COMMITTEE

JUNE 2025

Recommendations for the Purchase, Distribution, Use, and Disposal of Pharmaceuticals Used in Wildlife for Wildlife Management Agencies

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1) INTRODUCTION:

Objectives:

a) Present an overview of topical information on the purchase, distribution, administration, and disposal of pharmaceuticals used in wildlife.
b) Provide guidelines to assist in the development and management of a wildlife management agency's drug inventory program.

There is widespread use of various pharmacological and biologic agents (i.e., drugs) in wildlife management and research activities. Drugs commonly used in wildlife management can include (but are not limited to) immobilization and tranquilizing agents, vaccines and antimicrobials. The ability to use drugs in a wildlife setting can be jeopardized if government regulations or public trust is violated. As such, it is critical that those working with wildlife and drugs maintain awareness of current and changing regulations and evolving social attitudes so they can adopt and maintain appropriate and responsive management policies and procedures. These recommendations do not supersede any jurisdictional policies, laws, or consultations. Rather, they provide an overview of topical information, suggested guidelines, and appropriate practices that may assist the wildlife professional and veterinarian in complying with laws and regulations applicable to the purchase, distribution, use, and disposal of pharmaceuticals used in wildlife in Canada and the United States (USA).

2) LEGISLATIVE FRAMEWORK FOR OBTAINING AND USING VETERINARY PHARMACEUTICALS IN WILDLIFE:

OVERVIEW:

USA: The Food and Drug Administration (FDA) administers the Food, Drug, and Cosmetic Act (FD&C Act) and the Animal Medicinal Drug Use Clarification Act (AMDUCA); the Drug Enforcement Administration (DEA) administers the Controlled Substances Act (CSA) including the Veterinary Mobility Act (2014). The FDA is responsible for "protecting the public health by assuring the safety, efficacy, and security of human and veterinary drugs", and the DEA's mission is to "enforce the controlled substances laws and regulations of the United States."

CANADA: The Food and Drug Act and the Controlled Drugs and Substances Act (CDSA) are administered by Health Canada (HC). The mandate of HC is to "protect Canadians in matters relating to food, drugs, cosmetics and medical devices." There are two branches in HC that are responsible for overseeing the sale and use of drugs. The first, the Veterinary Drugs Directorate (VDD), is responsible for approving the sale of safe, efficacious and properly labeled veterinary drugs. The VDD manages Emergency Drug Releases and Experimental Studies Certificates for purchase and use of unapproved drugs (e.g., Telazol®, which is not approved for sale in Canada) in domestic animals and wildlife. The second, the Office of Controlled Substances (OCS), is located within the Controlled Substances Directorate, which administers the regulations covering the use of controlled drugs for medical and scientific research. For drugs produced by compounding pharmacies, Health Canada approves the base medications; the compounding pharmacies are regulated regionally with national standards (National Association of Pharmacy Regulatory Authorities).

FEDERAL ACTS:

FOOD, DRUG AND COSMETIC ACT (USA): The use and administration of pharmaceutical agents in animals is regulated by the FDA under the Federal FD&C Act (CFR 21 USC 503f). The purchase, administration, dispensing and prescribing of prescription pharmaceutical agents must be done

within the context of a valid veterinary-client-patient relationship (VCPR, described below) (21CFR 530.3). The FDA approves drugs for use in humans and animals after appropriate testing for safety and efficacy has been completed. When approving a drug, the FDA specifies the species, dosage, and route of administration and when appropriate, withdrawal times for various animal products destined for human consumption for each formulation of a pharmaceutical. Prescribing a drug, including drugs produced by a compounding pharmacy, for use in any manner other than as specified on the label is termed "extra-label drug use" (ELDU).

ANIMAL MEDICINAL DRUG USE CLARIFICATION ACT (USA): The ELDU and administration of pharmaceutical agents to animals is regulated by the FDA through the Animal Medicinal Drug Use Clarification Act (AMDUCA) (CFR 21, Part 530). The FDA has defined two groups of animals – food-producing and non-food producing. Under AMDUCA, wildlife species for which there is a hunting season (i.e., game species) are defined as food animals. Since the majority of pharmaceutical agents used in wildlife are prescription drugs that are used in an extra-label manner (i.e., in a species, dose, or frequency that is not specified on the drug label), the provisions of AMDUCA become the predominant regulatory authority for wildlife agency personnel. Some of the critical elements defined in AMDUCA include: 1) requirement of a valid VCPR, 2) well-defined record keeping, 3) establishment of meat withdrawal times for food-producing animals receiving pharmaceuticals, and 4) identification of animals receiving pharmaceuticals. There are additional limitations on drugs compounded from base chemicals by compounding pharmacies. Refer to the FDA issued Guidance for Industry #256. The industry has developed a list of drug substances for use in free-ranging wildlife; it contains some but not all of the commonly used immobilization drugs.

CONTROLLED SUBSTANCES ACT (USA): The CSA (CFR 21 Chapter 13) is administered by the DEA. The DEA is concerned with preventing illegal diversion of potentially harmful drugs called controlled substances (e.g., potent opioids, ketamine, and benzodiazepine), not their appropriate use in animals. The DEA requires registration by location in order to obtain, hold, and dispose of controlled substances (unless the individual is an end user such as a field biologist). A licensed veterinarian must also have a DEA registration to dispense or prescribe controlled substances. Registered users must adhere to strict record-keeping and storage

requirements for controlled substances. Wildlife agencies can obtain a DEA registration but must designate one person as the official responsible for the purchase, storage, and accounting of controlled substances. Typically, a consulting or staff veterinarian will be the designated official responsible for controlled substances but there may be several site-specific DEA registrations for a single agency and a designated responsible party for each. Persons possessing and administering controlled substances must store those substances appropriately and are independently accountable to the DEA, the person who holds the DEA registration for inventory and tracking, and to the consulting or staff veterinarian for prescribed use of the drug(s). The Veterinary Mobility Act (2014) modifies the CSA to allow veterinarians to transport and dispense controlled substances in the course of veterinary practice at a location other than the registrant's registered principal place of business, provided it is in the same state.

FOOD AND DRUG ACT (CANADA): The Food and Drug Act regulates the sale and use of prescription drugs. This legislation permits licensed veterinarians to prescribe drugs for animals under their care and supervision.

CONTROLLED DRUGS AND SUBSTANCES ACT (CDSA; CANADA): The purpose of the CDSA is to regulate the availability of controlled drugs (e.g., potent opioids, ketamine, and benzodiazepine). There are nine schedules of controlled drugs under this act and authorized individuals must follow security and storage, disposal, and record-keeping requirements. These drugs must be protected from loss and theft, and records that detail the purchase, storage and use of these drugs must be maintained for two years. In order to access controlled substances from outside Canada (e.g., thiafentanil), veterinarians must apply to VDD for an Emergency Drug Release and then receive approval from OCS to have the substance imported into Canada. For non-veterinarians to access controlled substances, they must first apply to VDD for an Experimental Studies Certificate, followed by an application to OCS for an exemption to Section 56 of the CDSA. A veterinarian can also apply for an exemption to Section 56 to provide controlled substances to non-veterinarians (e.g., wildlife biologists, technicians, or wildlife officers) (CAWV 2019; Kreeger et al. 2023).

ADDITIONAL JURISDICTIONAL REQUIREMENTS:

In addition to federal requirements, some jurisdictions (states and provinces) have Veterinary Medical Acts that also control the distribution and use of veterinary drugs (e.g., some states require holders of DEA registrations to also register with the respective state pharmacy board). Further, veterinarians are bound to practice by the bylaws and codes of ethics of their regional veterinary medical licensing body under which they hold a license. Veterinarians employed by the federal government of the USA are exempted from state licensure as long as they are practicing within the scope of their employment. Veterinarians employed by the federal government in Canada (e.g., Parks Canada) need to be licensed in at least one Province or Territory.

3) VETERINARY OVERSIGHT:

A valid Veterinarian-Client-Patient Relationship (VCPR) is one where: 1) the veterinarian has assumed responsibility for making medical or surgical judgments regarding the health of the animal, and the client has agreed to follow the veterinarian's instructions; 2) there is sufficient knowledge of the animals by virtue of examination of the animals or medically appropriate visits to the premises where the animals are kept, or in depth knowledge of the population of animals; and 3) the veterinarian is available for follow-up in case of adverse reactions or failure of treatment regimen. Agencies need to ensure that all staff or consulting veterinarians providing oversight are adequately experienced and possess training in wildlife veterinary medicine. It should not be assumed that all veterinarians possess the knowledge to properly, safely and appropriately prescribe or administer pharmaceuticals to wildlife in restraint, capture, or treatment situations.

USA: As required by the FDA through AMDUCA, a basic requirement for the administration of prescription drugs to animals is the establishment of a valid VCPR. The veterinarian may be either a staff veterinarian or consulting veterinarian contracted by the agency. The patient is defined as "an animal or group of animals," the VCPR can be applied to either. The client is defined most frequently as a wildlife biologist or officer. In some jurisdictions, universities or private consultants hired for research projects or specific management activities may also be

clients. However, any contractor or consultant should establish clear and appropriate veterinary oversight for individual projects through contracts or written agreements.

CANADA: The establishment of a valid VCPR prior to the dispensing or prescribing of pharmaceuticals for animals is a requirement by some provincial veterinary medical legislation and licensing bodies. Veterinary oversight for wildlife agencies in many of the provinces and territories is accomplished by a government wildlife veterinarian. In some cases, this role is filled by a consulting veterinarian who is contracted by the agency. In the case of VCPRs when pharmaceuticals are used in wildlife, the client is defined most frequently as a biologist or wildlife officer handling wildlife in the normal course of their job duties.

4) DRUG WITHDRAWAL TIMES:

The withdrawal time is the time that it takes for an animal to eliminate a drug from its body. For approved drugs being used per label instructions, this time has been determined and is included on the label. However, most drugs used for immobilization and treatment of wildlife are not approved for use in these species by the US FDA or by Canadian legislation. As such, they are used in wildlife as an ELDU. When drugs, including compounded drugs, are used in an ELDU manner, a withdrawal time must be determined and provided by the prescribing veterinarian in the event that a previously medicated animal is harvested for human consumption (Appendix I). When a veterinarian determines a withdrawal time for a drug used in an ELDU manner, they assume responsibility for any drug residues that may remain in meat and be consumed by humans. Veterinarians can apply data from any source (e.g., peer-reviewed published reports) to justify an appropriate withdrawal time for a specific drug in specific wildlife species under ELDU use. Veterinarians in the United States can submit questions to the Food Animal Residue Avoidance Databank (FARAD - www.farad.org) and Environmental Protection Agency (EPA - https://www.epa.gov/pesticides/modernizing-approach-epa-and-fda-oversight-animal-products-regulated-pesticides-or-new), and in Canada to the Canadian Global Food Animal Residue Avoidance Databank (CgFARAD - cgfarad.usask.ca/index.php). Practitioners must be aware of any drugs that are prohibited for use in food animals – the FDA (http://www.farad.org/prohibited-and-restricted-drugs.html) and HC (https://www.canada.ca/en/health-canada/services/drugs-health-products/veterinary-drugs/list-banned-drugs.html) have provided that list. Topical

treatments must also be considered in the context of withdrawal periods. Pesticides (e.g., permethrin spray, topical selamectin) are regulated separately; therefore, consultation regarding withdrawal times may need to occur in cases where they are used.

Individual animals to which drug(s) have been administered must be permanently identified or made ineligible for harvest to avoid entering the human food chain during the withdrawal period. Using an ear tag with “call XXX before consuming” language and a phone number where an appropriate official can be reached is an example of how this can be achieved. Agency protocols will need to address cases where wildlife may be consumed at any time of year (e.g., agencies allowing the public to harvest “roadkill” or an area where Indigenous Peoples have subsistence harvesting rights) as these animals may need to be permanently marked and appropriate drug records maintained year-round. Animals collected within the withdrawal period should be condemned as unfit for human consumption. It may be suitable for parts that are not normally consumed (e.g., hide, horns, antlers, claws) to be retained. Depending on each jurisdiction’s policies, if the animal is harvested beyond the withdrawal period, it may not be necessary to inform the collector that the animal had received medications previously.

Finally, consideration from the veterinarian’s perspective should be extended to judicious use of antimicrobial drugs to minimize the risk of antimicrobial resistance in wildlife. With free-ranging wildlife, treatment over a period of time is often impossible. Inappropriate duration of treatment is often unlikely to treat or decrease the risk of a bacterial infection but is likely to contribute to antimicrobial resistance. Veterinarians should critically evaluate the need for protocols including a single injection of a short-acting antibiotic or use of a board-spectrum, non-first-line antibiotic drug versus copious flushing of small wounds with clean water, diluted iodine, and/or diluted chlorhexidine. If long-acting antibiotics are used, an extended withdrawal period is typically necessary for that animal, which is another reason to carefully consider whether antimicrobial drugs are clinically indicated in each situation.

5) HUMAN SAFETY:

Some drugs used for wildlife immobilization are potentially lethal to humans. Accidental exposure of wildlife professionals while administering drugs to animals can occur through skin

contact, ingestion, inhalation, or injection. Therefore, drug safety procedures (including prevention and response) must be developed and carefully followed at all times. Initial and periodic refresher training on the use and handling of pharmaceuticals and sharps are critical for individuals at risk of exposure to drugs. These instructions should include knowledge of symptoms following accidental exposure, emergency treatment procedures (including human cardiopulmonary resuscitation (CPR) training and evacuation plans), and how to communicate necessary information to emergency responders. Before a particular drug is used, it is the responsibility of each supervisor to ensure that all personnel are familiar with the human safety aspects of that drug, understand the methods to prevent accidental exposure, and know the steps for response to exposure should one occur. Developing response protocols with local Emergency Medical Services (EMS) communities, where possible, can help mitigate some of these risks. Personnel accidentally exposed to drugs should be evaluated by medical professionals and exposure incidents should be reported in full to the appropriate supervisors even if signs of exposure do not occur.

Agencies should establish training requirements for handling immobilization drugs including initial certification, periodic renewal of certification and advanced training for handling certain classes of drugs or equipment. Periodic reviews by the program supervisor should be made to note deficiencies or gaps in training that might indicate a need for further training for administration of prescription drugs on wildlife. The potential exposure of untrained or volunteer personnel to potentially dangerous drugs is of great concern. Project leaders must avoid permitting such personnel from participating in tasks (e.g., handling, loading, or unloading darts and projectors) that might expose them to such drugs.

Accidental human exposure protocols should be created and reviewed prior to wildlife handling events where drugs will be used and should be printed out and kept on hand (Table 1, Figure 1). At a minimum, protocols should include emergency response measures, contact information for emergency medical personnel and/or facilities, and antagonist administration procedures if applicable. Protocols should designate a person trained in the institution's emergency protocol to serve as primary responder during an exposure event to direct the activation of EMS (where possible), CPR, and the administration of antagonists (Table 1). Where possible, safety protocols

should have had prior consultation with and review by a human medical professional (Powers et al. 2024; Table 1 for more detailed instructions).

Wildlife professionals administering drugs to wildlife should be trained in the basic pharmacological principles of the commonly used drugs, as well as in the use of appropriate antagonists. Commonly used drug classes for the immobilization and tranquilization of wildlife include ultrapotent opioids, opioids, alpha-2 agonists, cyclohexamines, butyrophenones, and benzodiazepines. Best practices to ensure human safety include early and ongoing conversations with local EMS personnel (when/where available), field safety briefings with the capture team, having two people present when handling drugs, appropriate use of personal protective equipment (e.g., gloves and eye protection at a minimum) and drawing up antagonists or having them readily accessible prior to drawing up immobilization agents. Two peer-reviewed publications discuss safety concerns and treatment recommendations for accidental exposure (Greenberg et al. 2018; Powers et al. 2024). It would be valuable to have copies of these papers on hand as human first responders and emergency room personnel may be unfamiliar with drugs used in veterinary or wildlife medicine.

PERSONNEL QUALIFICATIONS, TRAINING AND AGENCY LIABILITY:

All field personnel, including those directly administering controlled drugs and those assisting during a wildlife capture, should receive training on proper restraint and monitoring techniques, chemical immobilization, including the use of dart guns and other projectors, and maintain current first aid and CPR training. Firearm training may be necessary and should be required when target animals are potentially dangerous and personnel protection is provided through firearms. Ideally, immobilization and restraint training should be specific to the situations and species they are likely to encounter. Training should be documented and records retained for a set period based on state, provincial, territorial, and federal regulations. Continuing education or repetition of training should be required as a refresher and to convey new techniques or methodology.

Ultimately, the DEA registration holder, CDSA exemption holder, and licensed veterinarian retain responsibility for the purchase, storage, record keeping, administration and disposal of

controlled substances. Particularly if working for an agency, these individuals should consider consulting with their legal counsel and wildlife health specialists to ensure they are aware of the responsibilities they assume in regard to controlled substances and prescription drugs to determine the level of personal, professional, and agency liability.

6) RECORDKEEPING AND HANDLING:

OBTAINING AND ADMINISTERING DRUGS:

Veterinarians will need to possess, at a bare minimum, the necessary licensure required to satisfy their regional and jurisdictional requirements, usually a license to practice medicine. Additional licensure or certification may be needed for prescribing or purchasing controlled substances.

USA: A DEA registration must be obtained to purchase, possess, prescribe, or dispense a controlled substance. The end-user, to whom a drug is prescribed by name, does not require a DEA registration to purchase or possess the drug. The DEA defers to state licensing boards to evaluate practitioners for their ability to issue, prescribe, and administer drugs. While non-veterinarians may carry a DEA research registration to hold and administer controlled pharmaceuticals, the use and purchase of such drugs must be prescribed by a veterinarian. Regulations can change and there could be additional requirements to purchase and possess controlled drugs so the DEA website should be checked regularly (https://www.deadiversion.usdoj.gov/). Schedule II controlled drugs can only be purchased with an official DEA order form (Form 222) or through an electronic ordering system CSOS (www.deaecom.gov). These forms can be ordered by practitioners who are authorized to order schedule II drugs. After being filled out by the practitioner, an original copy is sent to the supplier, and a copy must be kept by the purchaser. It should be noted that in some jurisdictions, the state pharmacy board requirements may surpass federal DEA standards.

A prescription from the veterinarian must be in place in order to satisfy requirements for administration of drugs to animals under an established VCPR. AMDUCA requirements for prescribing extra-label drugs must be observed (name and address of the prescribing veterinarian, established name of the drug, species being administered the drug,

dosage/frequency of administration, duration of therapy, any cautionary statements, specific withdrawal times, expiry date). These prescriptions can be composed for an individual animal but are more commonly written for a species or population.

Investigational New Animal Drug (USA): Drug companies and distributors will sometimes make drugs available for experimental or investigational use. The FDA issues INAD permits to allow pharmaceutical companies to gather data on the use of these drugs that will assist registration of the drug for a given species. Records of INAD use need to be submitted to the manufacturer and retained for examination by FDA. Use of an INAD will be coordinated by the veterinarian overseeing the drug program to ensure all FDA reporting requirements are met. Agencies should issue and handle INAD in the same way as controlled substance drugs. If an INAD permit is granted, the researcher must ensure proper dosage, administration, and data collection. All animals given an INAD must be properly identified to permit future identification. Accurate individual animal records must be maintained and contain all information previously listed for individual animal forms with emphasis on identifying markings, dosages of drug, route of administration, responses, and any adverse effects.

CANADA: For non-veterinarians, non-controlled drugs can typically be obtained for use after the establishment of a VCPR, but this can vary based on provincial/territorial regulations. For controlled drugs, an Experimental Studies Certificate (https://www.canada.ca/content/dam/hc-sc/documents/services/drugs-health-products/veterinary-drugs/applications-submissions/forms/vddesc-track-changes-form-eng.pdf) application must be sent to the VDD, and an application exemption must be sent to the OCS. There may be additional criteria required depending on the status of the individual (e.g., veterinarian or non-veterinarian) by the VDD and the OCS for those looking to acquire and possess controlled drugs so it's best to refer to them prior to conducting an immobilization project (CAWV 2019; Kreeger et al. 2023).

RECORDKEEPING:

Recordkeeping requirements will vary based on regional law. Options to fulfill these requirements can include commercial logbooks or electronic systems paired with a capture datasheets or medical records for verification of appropriate animal care (Table 2).

DRUG INVENTORIES (USA): Accurate inventories must be kept at each DEA registered location. This includes an initial inventory at the start of a practitioner's registration period, as well as a minimum of one audit every two years to comply with DEA standards for controlled substances. Many state pharmacy boards will require more frequent drug inventories. A higher frequency of auditing may help to minimize unaccounted for drugs and reduce the chance for diversion. Any unexplained losses, thefts, or unaccountable shortages must be reported to the DEA. For non-controlled substances, regular inventories should be conducted to ensure any expired drugs are not used and are properly disposed of.

LOSS OR THEFT (USA): DEA registrants must report any significant loss or theft of controlled drugs online within one day using Form 106 (https://www.deadiversion.usdoj.gov/21cfr_reports/theft/theft-loss.html). While not required by law, the registrant should also consider notifying local law enforcement and state regulatory boards if theft of drugs occurred. Loss of drug volume in the form of missed darts, seepage from multidose vials, or minor spillage should be accurately recorded by field personnel. This will generally not constitute "significant" loss that warrants reporting to the DEA but should still be recorded ("significant" can be somewhat dependent on the inventory of the drug in question, and interpretation could vary depending on the DEA agent).

ADDITIONAL RECORD KEEPING (USA): The FDA requires accurate record keeping of any animal that may be legally harvested and consumed (Table 2). For this reason, an animal identification number must be deployed and traceable in record, usually by the veterinarian or other authority. Veterinarians should maintain health and anesthesia records to ensure adequate animal care during capture events. Capture forms should include the date and time of administration of immobilization drugs, controlled substance identification numbers if applicable, any ancillary drugs used, appropriate health monitoring parameters, demographic data, animal identification, duration of anesthesia, and other relevant notes (e.g., withdrawal time).

BORROWING OR LOANING CONTROLLED SUBSTANCES (USA): There is very limited provision in the law for borrowing or loaning of controlled substances, even between registered users. Transfers of Class II controlled substances are specifically regulated and require use of a 222

form. Loaning or exchanging controlled substances make it difficult to maintain accurate records and cannot be substituted for adequate planning for drug needs and usage. For these reasons, no controlled substances should be transferred to any person not directly affiliated with and approved by that agency without previous written permission from the registrant who will assume responsibility for the transfer.

DRUG STORAGE: Drugs should be stored in a secure location at all times (Table 3). Access should be limited to authorized personnel. Best practices for secure storage include requiring access through two locks at least one of which is a combination lock, and a temperature-controlled environment (above freezing and below 90°F/32°C), smaller safes should be secured to an integrated building structure, and safes should be capable of resisting break in with the use of tools for a significant amount of time (Table 3). In the USA, the CSA and associated rules detail the storage requirements for specific classes of controlled substance. In Canada, requirements for storage are based on the value of the geographic region of the license holder, value of the inventory of controlled substances and the classification of drugs being held. The security requirements are similar to those of the USA.

DRUG DISPOSAL: This can vary depending on jurisdiction. In some cases, controlled drugs that are expired, contaminated, or otherwise unfit for use can be returned to the registered location. In the USA, registrants may transfer these drugs to a DEA Reverse Distributor or follow measures for destruction of drugs outlined in 21 CFR 1317.05(a) (documented with a DEA Form 41) or in Canada, provided by the federal agency with oversight of the specific drug category. Prescription drugs may also be returned to a reverse distributor for destruction or inactivated and sent to a landfill if local ordinances allow. Drugs should never be disposed of down the drain.

7) EXAMPLES OF WIDLIFE DRUG PROGRAMS:

There are multiple ways that a wildlife agency veterinary drug program can be designed. We provide a few examples of possible programs and do not cover all possible ways to structure a program. One program structure may not be suited for all drug types and means of acquisition (e.g. compounded vs. commercially prepared drugs). The program should be tailored to the individual agency with guidance from the regulatory bodies overseeing drug usage as necessary.

Guidance from controlled drug regulators may vary, and some jurisdictions may receive specific guidance from their regulators on how programs should be set up. Agencies may consider using below structures, a combination of structures, or a structure not covered here.

Program Structure Example 1: Veterinarian (DEA Practitioner registration), field staff (DEA research registration) and regional approved storage locations.

The veterinarian with a DEA Practitioner registration prescribes the drugs to field staff with a DEA research registration. The veterinarian is responsible for overseeing appropriate drug use including recommended dosing. Drugs are shipped directly to the field staff at their registered storage location. The field staff with the DEA research registration are ultimately responsible for the receiving, logging, tracking, inventory, and disposal of all controlled substances prescribed to them. Field staff receiving drugs under their own DEA registration must still provide drug use records (Table 3) to the veterinarian to maintain a valid VCPR.

Program Structure Example 2: Veterinarian with DEA Practitioner registration at one central location (USA) or section 56(1) exemption (CANADA) prescribes to field staff for specific projects. Drugs are returned to central registered location after project completion.

All drugs are shipped to the veterinarian, who then prescribes them to the field staff across the agency. Drugs are temporarily stored at the regional offices, but these sites are not registered with state, provincial, territorial, and/or federal authorities as drug storage sites as they are end users. Unused controlled substances and empty vials are returned to the central registered location by field staff within 10 days following project completion. Staff receiving the drugs are responsible for tracking the receipt and use of the drugs in the field and provide a drug use report (Table 3) to the veterinarian. The field staff are also responsible for returning the drugs to the central location after the project is done. This model works best for project-based work, such as when captures take place over limited time periods, and is less suitable for tracking drugs continuously when small amounts are used for conflict or captive animal work.

Program Structure Example 3: Veterinarian (DEA Practitioner registration at multiple regional locations), field staff at location(s) where veterinarian is registered.

The veterinarian maintains DEA registrations at multiple locations across the jurisdiction. All drugs are shipped to the veterinarian at one of the registered locations where drugs will be stored and utilized. Drugs are stored at each registration location where they will be used and prescribed to the field staff at each location who are responsible for tracking all drug use and providing records to the veterinarian. This model requires the veterinarian to manage multiple registration locations, including keeping detailed records (Table 3) and inventories at each location. Appropriate systems must be in place to ensure adequate record keeping and enforce record-keeping requirements to protect the veterinarian.

Program Structure Example 4: Veterinarian (DEA Practitioner registration) prescribing to field staff through a pharmacy.

Veterinarian prescribes controlled drugs through a valid pharmacy either compounding or standard. Drugs are shipped directly to the field staff for use. This pharmacy model can be used to prescribe drugs to field staff as end users at non-registered storage locations. Inventories for the field staff as end users are not required; however, the veterinarian must maintain prescription records and the field staff are still required to provide records (Table 3) to the veterinarian to maintain a valid VCPR. This model is limited to only those drugs that are available through a pharmacy and may limit options for drug protocols.

8) CONCLUSIONS & ADDITIONAL CONSIDERATIONS:

This guidance was developed as a general overview of topical information regarding the purchase, distribution, use and disposal of pharmaceuticals in wildlife, and is intended to assist wildlife management agencies in developing their own drug programs. The information included may not be comprehensive, may change over time and can vary depending on the agency and jurisdiction. It is the responsibility of the veterinarian and all wildlife professionals involved in a drug program to know the relevant laws, policies and procedures and do their due diligence to remain compliant. Finally, while this document can assist with initial steps toward understanding the basic regulations and laws pertaining to the use of pharmaceuticals in

wildlife, it does not replace the need for training and experience in using these drugs. Prior to using unfamiliar drugs or working with new species, discussions or hands-on training with wildlife veterinarians or other personnel who have capture experience with those drugs and species, are strongly recommended. All drugs used in wildlife should be used in concert with training, advice, and mentorship. Wildlife veterinarians and other wildlife professionals who use drugs in animals should stay up to date with current practices (e.g., judicious use of antimicrobial drugs, animal welfare implications of handling/capture scenarios, etc.) as knowledge and policies change.

Table 1: An example human exposure protocol to be kept in field personnel drug kits.

Drug Class	Symptoms of accidental exposure	Initial response	Antagonist available[a]
Opioids: Thiafentanil, Etorphine, Butorphanol, Nalbuphine	Dizziness, nausea, pupil constriction, respiratory depression, decreased blood pressure, cyanosis, loss of consciousness, cardiopulmonary arrest	Decontaminate/remove dart Assess ABCs (airway, breathing, circulation), as indicated: • Place in rescue position • Administer antagonist • Provide respiratory support or CPR Call for EMS for evacuation Continue to monitor ABCs until individual is with human medical professional	Naloxone (intranasal): use as directed Naloxone (injectable): 0.4 mg IM or IV[b] Naltrexone (injectable): 100 mg IM or IV or 10 mg per 1 ml of thiafentanil Naltrexone (injectable): "antagonize etorphine and thiafentanil at a dose ratio (mg:mg) of 10-20:1 and 10-30:1, respectively".[c]
Alpha 2 agonists: Medetomidine, Xylazine, Dexmedetomidine	Sedation, changes in blood pressure, decreased heart rate, respiratory depression, dry mouth, elevated blood sugar	Decontaminate/remove dart Assess ABCs, as indicated: • Place in rescue position • Administer antagonist • Provide respiratory support or CPR Call EMS for Evacuation Continue to monitor ABCs until individual is with human medical professional	Atipamezole has not been FDA approved for use in humans; however, it has been experimentally shown to reverse the effects of alpha-2 drugs in humans and may provide life-saving measures in emergency field situations Atipamezole: 25-100 mg initial resuscitation Repeat doses of 0.6 mg/kg IM or 0.3 mg/kg IV slowly.[d]
Dissociatives: Ketamine, Tiletamine-zolazepam	Drowsiness, dizziness, behavioral changes, seizures, changes in blood pressure, nausea, headache, respiratory depression, unconsciousness	Decontaminate/remove dart Assess ABCs, as indicated: • Place in rescue position • Provide respiratory support or CPR Call for Evacuation Continue to monitor ABCs until individual is with human medical professional	None

[a] Some antagonist drugs are not approved for use in humans and should only be administered at one's own discretion or under the direction of a human medical professional.
[b] Rzasa-Lynn and Galinkin 2018
[c] Kreeger et al. 2023
[d] Greenberg et al. 2018; Powers et al. 2024

Table 2: List of data to record and retain as part of inventory and administration record keeping as required by USA regulations.

Data Category	Non-controlled substances:	Controlled substances (III, IV and V):	Controlled substances (II):
Drug Inventory	Could vary based on jurisdiction, however best practice would be • Name • Form/concentration • Expiration date • Lot number	Complete records for each substance (21 CFR 1304.11): • Name • Form/concentration • Mg or ml in each container • Number of containers • Other items as required per 21 CFR 1304	Complete records for each substance (21 CFR 1304.11): • Name • Form/concentration • Mg or ml in each container • Number of containers • Other items as required per 21 CFR 1304 • Records stored separately from CS III, IV and V
Animal identification	Animal may be legally harvested: • Animal identification number	Animal may be legally harvested: • Animal identification number	Animal may be legally harvested: • Animal identification number
Animal care, and drug administration	• Date and time of administration of immobilization drugs • Name of drug, active ingredient, and dose used • Species and demographic data • Animal identification • Duration of anesthesia • Appropriate health monitoring parameters • Other relevant notes	• Date and time of administration of immobilization drugs • Name of drug, active ingredient, and dose used, bottle number • Controlled substance identification numbers • Species and demographic data • Animal identification • Duration of anesthesia • Appropriate health monitoring parameters • Other relevant notes	• Date and time of administration of immobilization drugs • Name of drug, active ingredient, and dose used, bottle number • Controlled substance identification numbers • Species and demographic data • Animal identification • Appropriate health monitoring parameters • Duration of anesthesia • Other relevant notes
Length of time records must be maintained	Could vary based on jurisdiction	Records must be maintained for at least two years per the CSA Records must be kept separate from other non-controlled pharmaceuticals to allow for easy retrieval (21 CFR 1300.01(b))	Records must be maintained for at least two years per the CSA Records with corresponding DEA Form 222 must be maintained separately from other lower scheduled records

Table 3: Summary of required storage protocols for non-controlled and controlled substances (USA); while the regulations in Canada are based on the type of drug and amount of inventory the requirements are similar.

Location	Non-controlled substances:	Controlled substances (III, IV, and V):	Controlled substances (II):
Registered location, or office	Securely locked in a room with limited access; immobilization drug should be in a substantially constructed cabinet/safe	Securely locked, substantially constructed cabinet/safe (21 CFR 1301.76)	Stored in a safe that is equivalent to a U.S. Government Class V security container (21 CFR 1301.76) E.g., safes rated with Underwriter's Laboratories as TL-15 or stronger will meet this requirement Substance storage site must be registered with DEA
In the field (21 CFR 1301.76)	• All drugs should be protected and secured by the best means available to prevent damage (e.g., heat/cold), accidental exposure or theft • Drugs should never be left unattended	• All drugs should be protected and secured by the best means available to prevent damage (e.g., heat/cold), accidental exposure or theft • Portable suitcase type fire safes (e.g., pelican cases) can be utilized in the field to keep drugs under lock • Drugs should never be left unattended	• All drugs should be protected and secured by the best means available to prevent damage (e.g., heat/cold), accidental exposure or theft • Portable suitcase type fire safes (e.g., pelican cases) can be utilized in the field to keep drugs under lock • Drugs should never be left unattended

APPENDIX 1: Examples of Withdrawal Interval (WDI) for some commonly used drugs. Although withdrawal times are not necessarily established for wildlife species, they are justified as per Section 4 (drug withdrawal times). The information provided below are examples that are not set in law, are subject to change, can vary based on program, jurisdiction, and veterinarian. Each agency should determine their own guidelines.

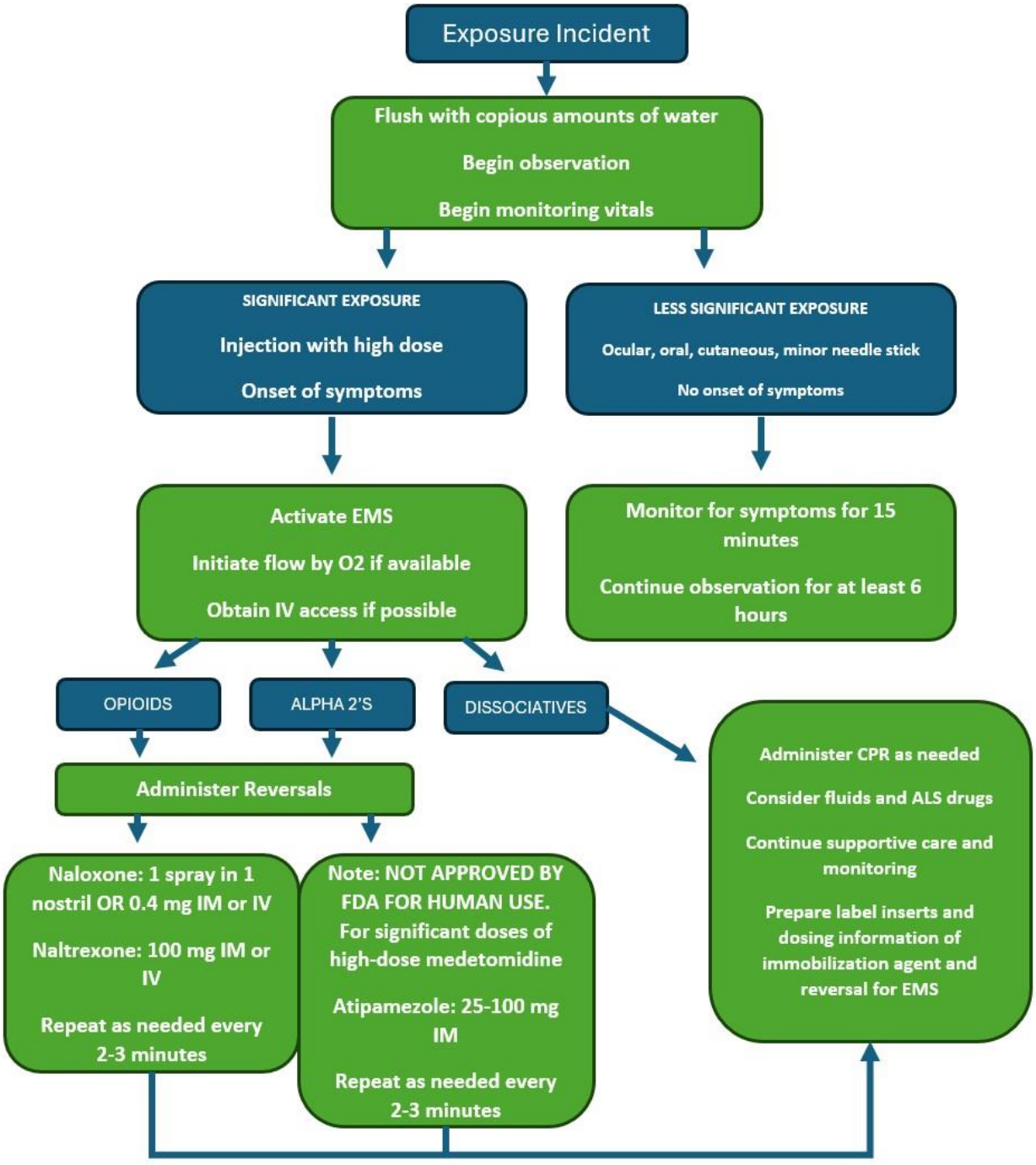
Active Ingredient (Drug Name)	Species[a]	Meat WDI (days)	Routes of Administration[b]	References & General Comments
Acepromazine	cattle, goat, sheep, swine	7	IV, IM	Craigmill et al. 1997; Haskell et al. 2003; Webb et al. 2004
Atipamezole	cervids	14	IM	Cook et al. 2016: no residues >0.01 ppm in meat and liver at 11 days post-injection of BAM in captive cervids
Azaperone	deer, swine	3, 14, 30	IM	Papich 1996; Cook et al. 2016
BAM	deer, black bear	8, 14	IM	Cook et al. 2016 Wolfe et al. 2020: no apparent tissue residues after 7 days in black bears
Butorphanol	cattle	5, 42	IV, IM	Smith 2013: 5 days is a conservative WDI for cattle; however, no tissue elimination data may warrant a longer WDI (7 CFR Part 205 National Organic Program, Subpart G-Administrative)
Detomidine	cattle, goat, sheep	3	IM, IV	Craigmill et al. 1997
Diazepam		7	IV	Fubini and Ducharme 2004: 7 days WDI recommended
Etorphine			IM	Papich 1996: recommended “the rule of 10” - 10 serum half-lives withdrawal period, makes WDI close to 3 months
Flunixin meglumine	cattle	4 (IV), 30 (IM)	IV, IM	Smith et al. 2008: WDI in cattle extends from 4 to 30 days when given IM

Ivermectin	cattle, deer, goat, sheep, swine	48, 56	SQ, PO, Topical	Baynes et al. 2000; Webb et al. 2004
Ketamine	cattle, goat, sheep, swine	3	IV, IM	Craigmill et al. 1997
Lidocaine	cattle	4	SQ	Sellers et al. 2009
Medetomidine		14	IM	
Midazolam		7	IM	Fubini and Ducharme 2004: 7 days WDI recommended
Naloxone		30	IM	
Naltrexone	deer	14, 45	IV, SQ	Webb et al. 2004; Cook et al. 2016
Penicillin G (benzathine)	cattle	30	SQ	National Dairy Farm Program 2014
Penicillin G (procaine)	cattle; swine	6-10; 8-20	IM, SQ	Halleran et al. 2021
Phenylbutazone	cattle	55	PO, IM	Smith et al. 2008
Selenium, Vitamin E (MU-SE, ANADA 200-109, etc.)	cattle, sheep	30	SQ	FDA.gov FOIA drug summaries for ANADA 200-109
Telazol (tiletamine/zolazepam)	black bear, polar bear	14, 45	IM	Semple et al. 2000; Ryan et al. 2009 Health Canada mandates a 45 day WDI
Tolazoline	cattle	8	IV	Haskell et al. 2003
Xylazine	cattle, goat, sheep	10	IM, IV	Craigmill et al. 1997; Webb et al. 2004
Yohimbine	cattle, goat, sheep	7	IV	Craigmill et al. 1997

[a]Species described in reference

[b]IM intramuscular, IV intravenous, PO per os or oral, SQ subcutaneous

Figure 1: An example flowchart detailing steps to take during an accidental human exposure to wildlife drugs. This information is not set in law, is subject to change, and can vary based on program, jurisdiction, veterinarian, and, if appropriate/possible, human medical advisor. Each agency should determine their own guidelines.



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