U.S. Government Accountability Office

Federal Lands: Effects of Interior's Policies on Foreign-Made Drones

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Q&A Report to Congressional Requesters

September 25, 2024

Why This Matters

Since 2006, the Department of the Interior has used uncrewed aircraft systems (UAS)—also called drones—in operations on the 500 million acres of federal lands it manages. These operations are often in remote areas and conducted under hazardous conditions, such as over steep terrain or during wildland fires. For example, Interior has used drones to manage or prevent wildfires, such as by collecting information on fires' locations and potential to spread. Using drones for a variety of missions can improve safety and reduce costs, among other advantages over alternative methods. Additionally, other entities, including the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) have partnered with Interior to use drones on Interior-managed lands.

Figure 1: Department of the Interior Drone Conducting Aerial Ignition Operations

Source: Department of the Interior. | GAO-24-106924

Since fiscal year 2020, Interior has made various revisions to its policies on drone purchase and use amid concerns about potential security risks of foreign-made drones.

We were asked to review these policies and their effects. This report examines the effects on the drone fleets and operations of Interior's four most active drone users—the Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), National Park Service (NPS), and U.S. Geological Survey (USGS)—as well as on NOAA and nonfederal partners.

Key Takeaways

- From January 2020 through October 2022, Interior prohibited the procurement and nonemergency use of drones manufactured by companies domiciled in countries designated as adversary nations. In response to this policy, the selected bureaus halted all nonemergency drone flights during this

time frame, according to officials. As of June 2024, the prohibition on procurement was still in place, with new exemptions for wildfire management and search and rescue operations.

- The majority of the selected bureaus' drones are reaching the end of their usable lives, according to Interior and bureau officials. However, increased costs and other challenges with procuring compliant drones have made it difficult for bureaus to replace their drones, according to Interior and bureau officials.
- Because of their diminishing drone fleets, Interior bureaus have not been able to expand their use of drones for emergency operations, according to officials. Some bureaus no longer have enough drones to meet their needs for such operations, and using alternative methods such as helicopters can increase costs and safety risks, according to bureau officials.
- The bureaus have also faced challenges with resuming nonemergency drone flights because of an insufficient number of drones, according to officials. This has affected Interior operations in various ways, such as the use of alternative methods instead of drones and loss of opportunities to collect data on landscapes, natural and cultural resources, wildlife, and infrastructure.

What policies has Interior implemented on foreign-made drones?

Since October 2019, Interior has implemented policies limiting the department's use and purchase of certain foreign-made drones, as well as its partners' use of drones on Interior-managed lands.[1]

Limitations on Interior's use

In October 2019, Interior leadership instructed Interior bureaus via email to cease all nonemergency drone flights.[2] In January 2020, Interior issued a secretarial order that refined the cessation to apply to nonemergency flights of certain Interior drones. Specifically, it applied to drones that were manufactured by or contained designated components—such as for data collection, storage, and transmission—from certain foreign-owned companies in countries designated as adversary nations.[3] In this report, we refer to these as noncompliant drones. The January 2020 order was intended to better ensure cybersecurity, among other things, according to the order.

Interior's emergency flights were excepted from the cessation. In implementing guidance for its order, Interior initially defined emergency flights as operations or related training flights for

- fighting or preventing existing or anticipated wildland fires, including fuels management operations such as prescribed fires;
- monitoring for or responding to a potential or declared national or state emergency involving human safety or to prevent imminent damage to human life and property; or
- conducting a human search and rescue effort that involves the preservation or safety of human life or physical property as a core component of the mission.

In March 2021, Interior expanded its definition of emergency operations to include flights required to characterize susceptibility to, or impacts from, natural hazards such as floods, landslides, volcanic eruptions, coastal erosion, hurricanes, or earthquakes.[4]

In May 2021, Interior completed a review of its drone program that concluded that Interior's security strategy sufficiently mitigated potential risks posed by

noncompliant drones. The review found that the environment in which the department uses its drones is overall of low security risk because these lands are largely accessible to the public and typically removed from areas of national security interest.

In October 2022, Interior issued a memorandum citing its review and revising its policy to allow bureaus to resume flying their existing noncompliant drones for nonemergency flights.[5] We refer to the period between Interior's October 2019 email and this memorandum as the grounding period.

Restrictions on foreign-made drones have also been made across the federal government. Specifically, the American Security Drone Act of 2023 generally prohibits federal operation of certain foreign-made drones from December 2025 through December 2028.[6] The act exempts federal agencies' operation of such drones, in consultation with the Secretary of Homeland Security, to the extent necessary to support the full range of wildfire management or search and rescue operations. Interior conducted that consultation and invoked this exemption in February 2024.

Limitations on Interior's purchases

Interior's January 2020 order prohibited Interior bureaus from purchasing noncompliant drones. In addition to better ensuring cybersecurity, this order was intended to facilitate domestic production capability for drones, according to the order. The order cited a 2019 presidential determination stating that domestic production capability for small drones was essential to national defense.[7]

Interior's October 2022 memorandum continued to prohibit Interior bureaus from purchasing noncompliant drones.[8] According to this memorandum, Interior's revised policy satisfies the security measures and related mitigations pursuant to Executive Order 13981.[9] That executive order, issued in January 2021, discouraged federal purchase of drones manufactured in adversary nations and encouraged agencies to replace such drones.[10] Interior's policy revision incorporated the executive order's definition of covered aircraft: those manufactured in whole or in part by an entity domiciled in an adversary country or using or containing certain components.[11]

In addition, the American Security Drone Act of 2023 generally prohibits federal procurement of certain foreign-made drones until December 2028, with an exemption for procurement necessary to support the full range of wildfire management or search and rescue operations as previously described for the operations prohibition.[12] Interior's February 2024 exemption allows the department to procure such drones to support the full range of wildfire management or search and rescue operations. Apart from these exemptions, as of June 2024, Interior's prohibition on procuring such drones remained in place, according to Interior officials.

Limitations on partners' use

Interior's January 2020 order directed Interior bureaus to, in their contracts, grants, or cooperative agreements with other entities, prohibit them from operating noncompliant drones on department-managed lands. This prohibition applied to partner organizations, including other federal agencies.[13]

Interior's October 2022 memorandum continued to restrict partners from operating noncompliant drones on Interior-managed lands. The American Security Drone Act of 2023 exempts NOAA from the act's prohibitions on procurement and operation of certain foreign-made drones when necessary for meeting NOAA's science or management objectives or operational mission.[14]

However, Interior's limitations remained in place for NOAA and other partners as of June 2024, according to Interior officials.

How has Interior used drones?

Since 2006, Interior has used drones for a wide range of purposes. BLM, FWS, NPS, and USGS—the department's most active drone users—began using drones at different points in time.[15] In the years just before the grounding period, drone usage was increasing. Specifically, the total number of flights each bureau conducted each fiscal year increased from 2017 through 2019. Prior to the grounding period, the bureaus had anticipated expanding their use of drones in subsequent years because of their safety, cost, and data collection advantages over ground-based or crewed aircraft methods, according to bureau officials.

The four bureaus have used drones for purposes such as studying and managing natural resources (see fig. 2).

Figure 2: Examples of Department of the Interior Drone Flights for Studying and Managing Natural Resources

Type of flights	Examples of flights
Landscapes and natural resources 	Interior has used drones for mapping and long-term monitoring of vegetation, land use impacts, land and habitat restoration, glaciers, mineral and energy resources, water levels and quality, erosion and slope stability, thermal studies, and climate change indicators. • **BLM** mapped or monitored snowy plover habitat and sage brush restoration areas in Oregon, rangeland health in Arizona, and post-mining recovery of in-stream and riparian habitat in Alaska. • **FWS** measured aquatic vegetation in Oregon as part of a study on invasive common carp and mapped areas for weed eradication and prairie restoration at Nestucca Bay National Wildlife Refuge in Oregon. • **NPS** in Alaska mapped patterns in permafrost thawing, created imaging to analyze coastline changes, and produced 3D models of historic districts to assess land instability from permafrost melt. • **USGS** mapped areas for dam removals in Washington, California, and Massachusetts; identified harmful algal blooms in West Virginia and Oregon; and measured volcanic gases at Mount St. Helens in Washington.
Wildlife 	Interior has used drones to monitor wildlife populations, such as using thermal imaging to count birds in their nests at night. • **BLM** surveyed pronghorn and sage grouse in Montana, raptors in Alaska, and a golden eagle nest in Idaho. • **FWS** surveyed a bald eagle nest, Aleutian terns, and nesting eiders in Alaska; bears, pythons, crested caracara, and nesting least terns in Florida; a wolf den in Wyoming; and critically endangered sandhill cranes in Mississippi. • **NPS** surveyed bear activity and nesting Canada jays in Alaska. • **USGS** surveyed walruses in Alaska, waterfowl in California, and chinook salmon in Idaho and Oregon.
Wildland fires 	Interior has used drones to provide information on fires' locations, heat, and rates of spread, including mapping perimeters of fires and locating their hot spots—active or smoldering areas that could increase fire spread. Drones also performed aerial ignition to manage or prevent wildland fires. • **BLM** assessed perimeters of the Bylas and Gila River Fires in Arizona and conducted nighttime aerial ignition that helped contain the Pine Gulch Fire in Colorado. • **FWS** conducted aerial ignition and thermal imaging to support the Moose Fire in Idaho and prescribed fire missions at the Florida Panther National Wildlife Refuge. • **NPS** conducted aerial ignition for the Dixie and Bluejay Fires in California and mapped large portions of the Castolon Fire in Texas.

BLM - Bureau of Land Management
FWS - Fish and Wildlife Service
NPS - National Park Service
USGS - U.S. Geological Survey

Sources: Department of the Interior (information); GAO (analysis and icons). | GAO-24-106924

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Sources: Department of the Interior (information); GAO (analysis and icons). I GA0-24-106924

Note: GAO analyzed documents and flight records and interviewed officials from the Department of the Interior.

The bureaus have also used drones for a variety of other purposes, such as training; monitoring facilities, other infrastructure, and cultural resources; law enforcement and search and rescue; and education and public affairs (see fig. 3).

Figure 3: Examples of Drone Flights by the Department of the Interior for Purposes Other Than Managing Natural Resources

Type of flights	Examples of flights
Training 	Interior drone pilots must complete training flights to comply with Interior requirements. • Within 90 days preceding a mission flight, pilots must have successfully demonstrated at least three takeoffs and landings with the specific drone they are approved to operate. • Pilots must fly each of the aircraft for which they are approved at least once every 12 months or at another approved interval.
Facilities and other infrastructure 	Interior has used drones to map or inspect bridges, dams, and buildings to detect and document repairs needed, including after storm damage. • **FWS** assessed post-hurricane levee breaches in Texas, a lighthouse in Florida, impacts of beaver dams on roads in Wisconsin, and storm damage to structures at the Midway Atoll National Wildlife Refuge. • **NPS** inspected a dam in Maryland, post-hurricane effects on roads in Death Valley National Park in California, and buildings at Cape Lookout National Seashore in North Carolina.
Cultural resources 	Interior has used drones at historical and archaeological sites to address research issues, enhance park interpretation, and protect and preserve resources. • **BLM** monitored or mapped cultural resources at Fort Craig Historic Site in New Mexico and Garnet Ghost Town in Montana. • **NPS** studied archeological sites at Montezuma Castle National Monument in Arizona and Mesa Verde National Park in Colorado. • **USGS** documented the oldest fossilized human footprints in North America at White Sands National Park in New Mexico.
Law enforcement and search and rescue 	Interior has used drones for evidence collection, crime scene or accident reconstruction, search and rescue, and assistance to the Department of Homeland Security with border patrols. • **FWS** supported investigations into human causes of wildfires and monitored poachers in Wyoming and trespassing at the Florida Panther National Wildlife Refuge. • **NPS** conducted an aerial search for an injured person after a motor vehicle accident in Pennsylvania.
Education and public affairs 	Interior has used drones to collect images or video for public communication and educational purposes. • **BLM** collected still images and video in Oregon to demonstrate successful prescribed fire efforts to the public. • **FWS** collected video in New Mexico for training on electrofishing and in Oregon for educational outreach about using drones for monitoring terns. • **NPS** created a promotional video celebrating the anniversary of the lighting of the Ocracoke Lighthouse in North Carolina. BLM - Bureau of Land Management FWS - Fish and Wildlife Service NPS - National Park Service USGS - U.S. Geological Survey

Sources: Department of the Interior (information); GAO (analysis and icons); and makstorm/stock.adobe.com (icons). | GAO-24-106924

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- FWS = Fish and Wildlife Service
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Note: GAO analyzed documents and flight records and obtained written information from Department of the Interior officials.

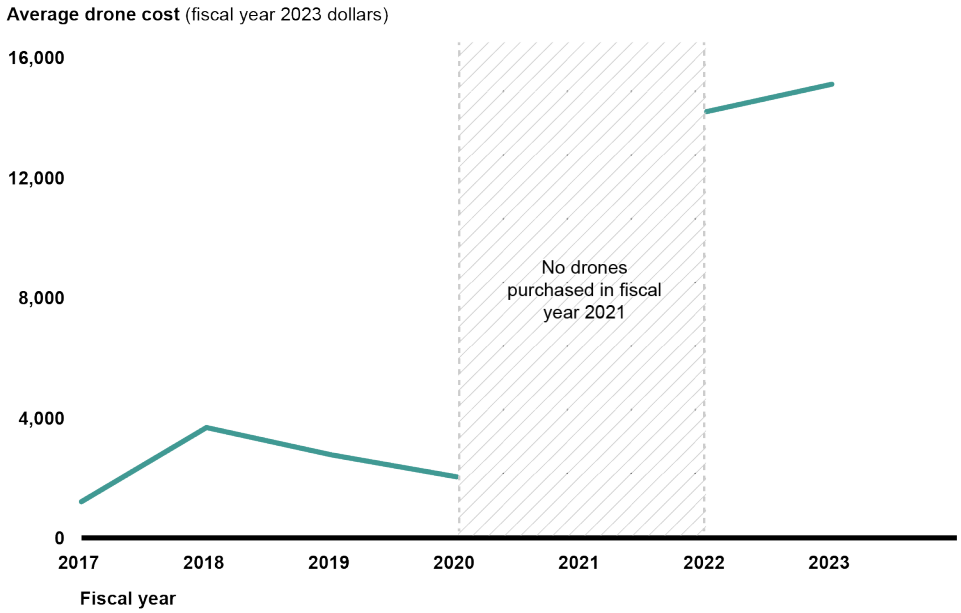
What challenges has Interior faced with identifying and procuring compliant drones?

Since Interior's drone policies went into effect, the department has faced several challenges with identifying and procuring compliant drones, which have affected

its ability to maintain a sufficient drone fleet and replace noncompliant drones, according to Interior officials. These challenges include the following:

- **Increased cost of compliant drones.** The compliant drones the department purchased across all bureaus in fiscal years 2022 and 2023 cost significantly more than the commercial models it previously purchased, according to Interior documents and officials. From fiscal years 2017 through 2020, the average cost per drone was approximately $2,600, adjusted to 2023 dollars, according to our analysis of Interior procurement data.[16] The average cost per drone increased to over $14,000 in fiscal year 2022 and over $15,000 in fiscal year 2023 (see fig. 4).

Figure 4: Department of the Interior's Average Cost per Drone, Fiscal Years 2017–2023



Source: GAO analysis of Department of the Interior information. | GAO-24-106924

Accessible Data for Figure 4: Department of the Interior's Average Cost per Drone, Fiscal Years 2017–2023

Fiscal Year	Average drone cost (fiscal year 2023 dollars)
2017	$1,208
2018	$3,678
2019	$2,768
2020	$2,037
2021	N/A
2022	$14,201
2023	$15,113

Source: GAO analysis of Department of the Interior information. I GAO-24-106924

Note: Interior procured a total of 850 drones from fiscal years 2017 through 2023.

Interior and bureau officials also told us that in some cases, drones that meet certain mission needs require further modifications to be fully compliant, which incurs additional costs. Bureau officials gave us an example of a drone that might meet certain mission needs but has a noncompliant radio system. This drone could be modified to meet Interior's policy requirements for about $8,000, according to Interior officials.

Officials from Interior and three of the four bureaus we spoke with told us that, given the higher cost of compliant drones, they may be unable to procure a sufficient number of drones. Some officials told us that bureaus are

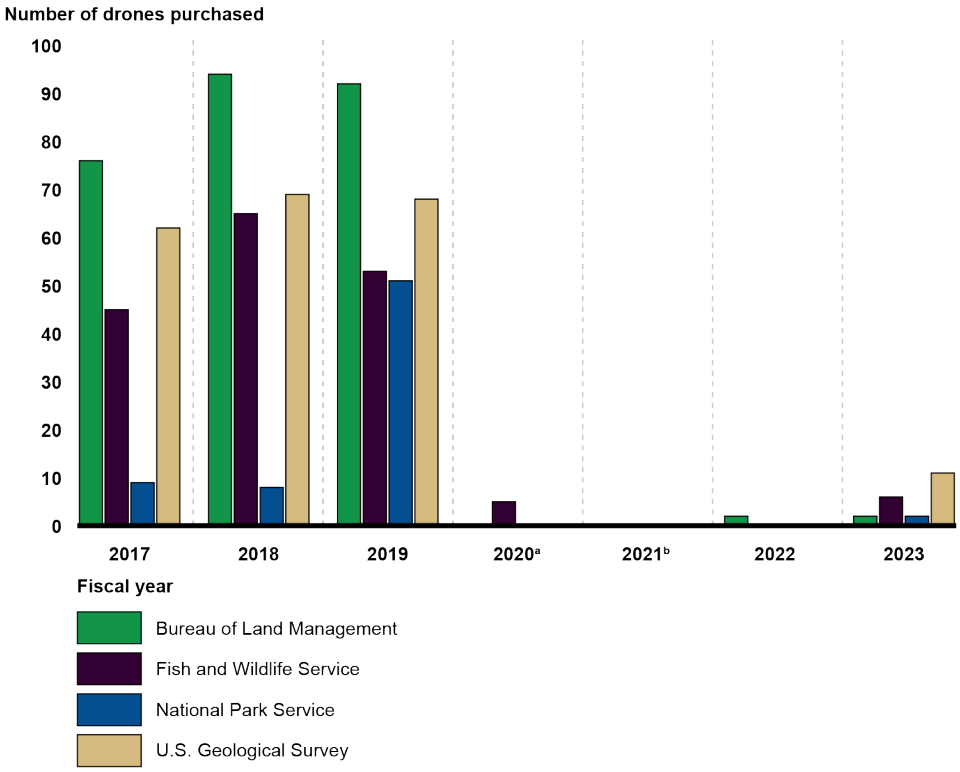
exploring ways to adapt to this increased cost, such as through procuring drones that multiple program offices can share.

- **Delays in receiving drones.** Some compliant drones Interior identified for procurement, as well as some foreign-made drones allowed under the American Security Drone Act for the full range of wildfire operations, are not readily available and could take as long as 6 months to receive after ordering, according to Interior and bureau officials. As of April 2024, Interior had ordered 98 drones in fiscal year 2024, but only 46 had been delivered. Some bureaus noted program impacts from these delays. For example, NPS officials told us the service ordered new drones for fire management purposes in March of this year, but they are not expected to arrive until October, likely not in time to be used for the 2024 wildfire season.
- **Technological capability issues with compliant drones.** It has been difficult to find compliant drones with sufficient technological capabilities to fully meet mission needs, according to Interior and some bureau officials. For example, BLM officials noted that compliant drone options do not have the capability to carry some specialized sensors, and USGS officials told us they have not found a sufficient replacement for the noncompliant drones they previously used to characterize natural hazards.
- **Reliability issues with compliant drones.** Until recently, Interior's early testing and evaluation of compliant drones revealed significant reliability issues, Interior and bureau officials told us. For example, officials cited instances in which tests of compliant models revealed propeller issues that caused drones to abruptly crash. However, Interior and some bureau officials said that as of early 2024, they have been able to identify more reliable compliant models that have not had these issues.

Because of these challenges, Interior has not been able to fully replace noncompliant drones as they are decommissioned for age or other reasons, according to Interior officials. Although Interior has made its needs known to manufacturers of compliant drones, these manufacturers only have a limited number of models that fully meet the department's mission needs, according to Interior officials.

The majority of noncompliant drones bureaus purchased before the grounding are reaching the end of their usable lives, according to officials from three of the four bureaus we spoke with. The department's drones have a typical lifespan of about 3 to 5 years, officials said, but this can become shorter because of other factors, including operating in harsh environments or manufacturers going out of business and ending support for their drones. Nearly all of the selected bureaus' drones are at least 5 years old as of fiscal year 2024, as figure 5 shows.

Figure 5: Number of Drones Purchased by Selected Department of the Interior Bureaus, Fiscal Years 2017–2023



Source: GAO analysis of Department of the Interior information. | GAO-24-106924

Accessible Data for Figure 5: Number of Drones Purchased by Selected Department of the Interior Bureaus, Fiscal Years 2017–2023

Fiscal Year	Bureau of Land Management	Fish and Wildlife Service	National Park Service	U.S. Geological Survey
2017	76	45	9	62
2018	94	65	8	69
2019	92	53	51	68
2020[a]	0	5	0	0
2021[b]	0	0	0	0
2022	2	0	0	0
2023	2	6	2	11

Source: GAO analysis of Department of the Interior information. I GAO-24-106924

[a]FWS purchased the five drones in fiscal year 2020 before Interior issued its drone policy.
[b]The bureaus did not purchase any drones in fiscal year 2021.

Note: We selected these four bureaus because they have been Interior's most active users of drones.

Interior's October 2022 policy revision allowed the bureaus to resume using noncompliant drones purchased prior to the grounding order. However, the American Security Drone Act of 2023 will prohibit Interior from flying these drones after December 2025 except those used for the full range of wildfire management and search and rescue activities.

How have Interior's drone policies affected the overall number of drone flights?

After Interior's fiscal year 2020 email and order, the overall number of drone flights decreased and, as of fiscal year 2023, had not returned to 2019 levels.

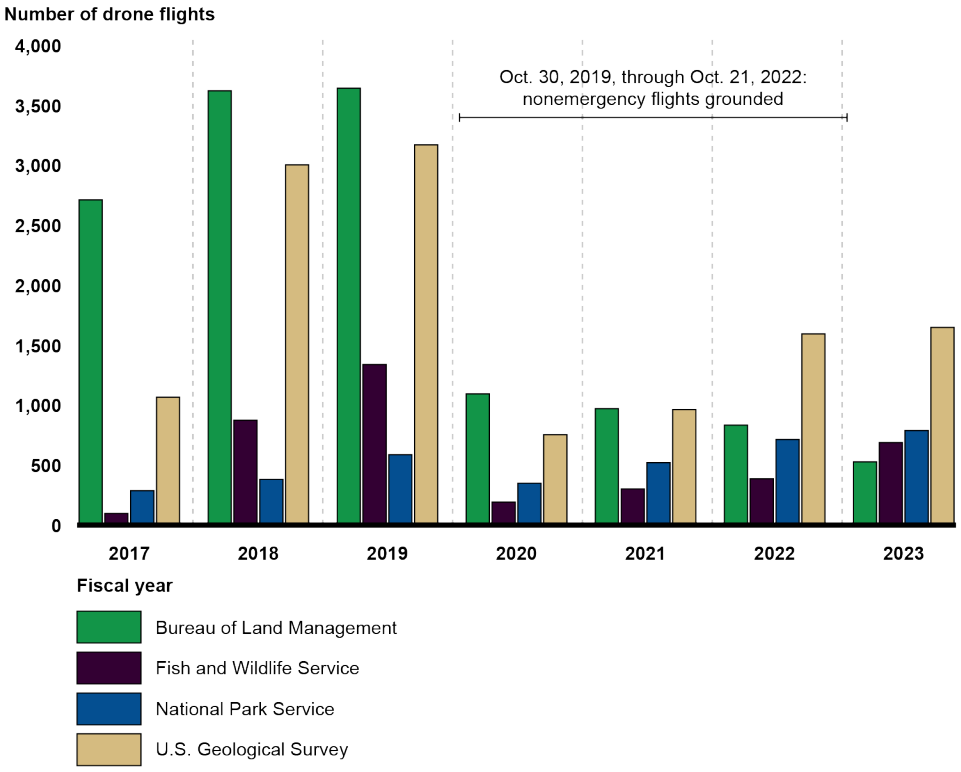
Prior to the grounding period, most drone operations were for nonemergency flights, according to bureau officials.

Three bureaus—BLM, FWS, and USGS—significantly reduced their drone flights in fiscal years 2020 through 2022 compared with previous years (see fig. 6). This was because all Interior drones were considered noncompliant and could be flown only for emergency operations or related training, according to Interior officials. This effectively eliminated nonemergency drone flights until Interior revised its policy in October 2022.

As of fiscal year 2023, total flights for each of these bureaus were still below 2019 levels due to their diminished drone fleets and challenges with identifying and purchasing new drones that meet their needs, according to bureau officials.

NPS's drone flights initially decreased in fiscal year 2020, then increased and surpassed 2019 levels in fiscal years 2022 and 2023 because of increased wildland fire operations during what officials said were heavy fire years nationwide.

Figure 6: Number of Drone Flights by Selected Department of the Interior Bureaus, Fiscal Years 2017–2023



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Accessible Data for Figure 6: Number of Drone Flights by Selected Department of the Interior Bureaus, Fiscal Years 2017–2023

Fiscal year	BLM	FWS	NPS	USGS
2017	2712	98	288	1067
2018	3621	875	382	3004
2019	3643	1340	588	3170
2020	1095	192	350	755
2021	972	303	521	964
2022	835	386	715	1594
2023	528	689	789	1649

- Oct. 30, 2019: non-emergency flights grounded
- Oct. 21, 2022: non-emergency flights allowed to resume

Source: GAO analysis of Department of the Interior information. I GAO-24-106924

Note: GAO analyzed the Department of the Interior's drone flight records for fiscal years 2017 through 2023. We selected these four bureaus because they have been Interior's most active users of drones. These data represent the numbers of flights for which the selected bureaus were in operational control. Changes in the number of drone flights after Interior's October 30, 2019, policy change do not necessarily represent the precise effect of the policy because other factors may have also influenced trends in drone usage.

How have Interior's drone policies affected drone use for emergency operations?

During the grounding period, the four bureaus focused their drone operations exclusively on emergency operations and related training flights, according to bureau officials. For BLM, FWS, and NPS, these emergency drone operations focused on wildland fires, bureau officials said. Emergency drone operations by FWS and NPS also included nonfire operations such as those focused on natural hazards, severe weather, law enforcement, and search and rescue, according to bureau officials. USGS's emergency drone operations focused on natural hazards, bureau officials said.

Since the grounding period ended, BLM, FWS, and NPS have continued to focus primarily on emergency drone operations but have had difficulty maintaining or expanding use of drones for these operations because of challenges with diminishing drone fleets, according to bureau officials. USGS's focus has returned to nonemergency operations (discussed later in this report), and the bureau has reduced its drone flights for characterizing natural hazards because of similar challenges with its drone fleet, a USGS official said.

Wildland fire operations

During and after the grounding period, emergency drone operations by BLM, FWS, and NPS have focused on wildland fires and related training flights, according to these bureaus' officials. For example, BLM officials emphasized the importance of using drones for thermal imaging to monitor fire perimeters and hotspots, which are active or smoldering areas that could increase fire spread. Bureaus have also used drones for aerial ignition of deliberate, planned fires to reduce fuels (vegetation), which can help prevent or manage the intensity of wildfires.

As we have previously reported, the size and severity of wildfires have increased across much of the United States in recent decades, as has the length of wildfire seasons.[17] This has increased demands on the federal wildland firefighting workforce, of which about 28 percent (5,291 staff) were from BLM, FWS, and NPS in fiscal year 2021, as we reported in November 2022.[18]

However, because of their diminishing drone fleets, BLM, FWS, and NPS have not been able to expand their use of drones for wildland fire missions. Moreover, officials from BLM and NPS said their bureaus' decreased fleets have led them to reduce their wildland fire drone operations and increase their use of alternative methods, which include ground-based methods and crewed flights, such as helicopters. However, this increases costs and the risks to pilots and firefighters, according to bureau officials and Interior documents.

For example, BLM and NPS need to conduct more aerial ignition operations than they can accomplish with their existing drone fleets, and they have shifted to other methods, such as helicopters, for some aerial ignition operations, according to these bureaus' officials. However, as NPS officials noted, using helicopters for aerial ignition involves three personnel flying close to the ground, potentially in low-visibility conditions, presenting significantly more risk to personnel compared with drones. Interior officials emphasized that drones can fly at low altitudes, at

night, and through smoke—conditions that can be hazardous or impossible for helicopters. However, ground-based methods for ignition, which involve crews on foot using drip torches or other equipment, may not be possible in all terrain, according to FWS officials. BLM, FWS, and NPS officials said that while drones are not suitable for all aerial ignition operations, such as those covering very large areas, they should be used when appropriate.

Interior has begun purchasing new drones for its wildland fire operations; however, the drones' cost has increased. For example, in fiscal year 2019, Interior's cost for a noncompliant drone fully outfitted with the equipment for aerial ignition was approximately $52,000, according to a department official. In fiscal year 2024, the cost for a similarly outfitted drone that is compliant, except for one component, was approximately $86,000, the official said.

Interior has an exemption under the American Security Drone Act of 2023 that allows it to purchase noncompliant drones for the full range of wildfire management purposes. However, according to an Interior official, the department is reluctant to purchase less expensive, fully noncompliant drones for its fire operations because of uncertainty about the potential for future legislative actions banning their use.

Nonfire emergency operations

Three of the four bureaus have conducted some nonfire emergency operations but have faced challenges with maintaining or expanding them because of diminishing drone fleets, according to bureau officials.

While most NPS and FWS emergency drone operations are for wildland fires, these bureaus have conducted some flights for hurricane and flood damage assessment, search and rescue, and law enforcement, according to bureau officials. Officials said that NPS's operations have also addressed hazards such as landslides and rock falls and repairs of sewer or water systems that can affect public health. However, NPS and FWS have been unable to expand their search and rescue and law enforcement programs as previously planned prior to the grounding period because of their diminishing drone fleets, according to these bureaus' officials. NPS officials also said that the bureau no longer has enough drones to meet its needs for nonfire emergency flights.

During the grounding period, USGS's drone flights were limited to characterizing susceptibility to, or impacts from, natural hazards and related training flights, according to USGS officials. For example, USGS used drones to monitor volcanic activity using thermal imagery and volcanic gas sampling at Hawaii's Kilauea—the largest volcanic threat in the U.S. However, USGS's diminishing fleet has led the bureau to reduce its drone operations to characterize natural hazards, according to a USGS official. Further, the official told us that the compliant drones USGS is buying do not meet all of USGS's needs or replace the capabilities of all the bureau's noncompliant drones for characterizing natural hazards. The official said there is also decreased interest by USGS centers in continuing to invest in very expensive drones—and the staff to fly them—because of the potential risk of having to shut down the drone program again in the future.

How have Interior's drone policies affected drone use for nonemergency operations?

In response to Interior policy, the bureaus halted all drone flights that were not considered emergency operations or related training during fiscal years 2020 through 2022, according to bureau officials. Prior to the grounding period, most drone operations were for nonemergency flights, these officials said. According

to a 2021 Interior report, before the grounding period, approximately 68 percent of the department's drone flights were in support of science-related missions.[19]

Officials told us that the bureaus have struggled to resume many of these nonemergency drone operations since Interior's October 2022 policy revision because of insufficient numbers of aircraft. Decreased use of drones for nonemergency flights has affected Interior operations in a variety of ways.

Use of other methods

In some cases, Interior may shift nonemergency operations to methods other than using drones. However, using other approaches such as crewed aircraft or ground-based methods instead of drones can lead to the loss of some advantages drones offer. For example:

- **Collection of higher-quality data.** Interior's drone-borne sensors provided better image resolution than data acquired by crewed aircraft or satellites, according to a 2021 Interior report.
- **Lower costs or less labor.** The operating cost of using a drone for a project is less than that for crewed aircraft, according to 2019 and 2021 Interior reports. Further, compared with ground-based methods such as using employees on foot, drones can generally complete a given task more quickly and at lower cost, according to a 2019 Interior report.
- **Reduced human safety risks.** Drones have enabled the department to accomplish its missions while removing employees from environments with potentially hazardous conditions such as steep and rocky terrain, flooding, volcanic eruption, noxious gases, and dangerous animals, according to a 2021 Interior report. In contrast, according to the report, the majority of Interior's field biologist fatalities from 1937 to 2000 were related to crewed aircraft. Interior also reported in 2021 that NPS's use of drones for inspecting historic structures or monuments reduced significant risks to employees who would have ascended structures using ropes or tenuous stairwells in dilapidated structures.
- **Reduced disturbance to wildlife and habitat.** Drones can provide advantages over other methods, such as crewed aircraft and personnel on foot, by reducing disturbance to wildlife, according to Interior officials. For example, USGS has used drones in Alaska to assess the effects of declining sea ice and increasing human activities on walrus abundance. According to a 2022 USGS report on this effort, drones reduce the risk of disturbance to walruses that seek refuge on shorelines in tightly packed groups known as coastal haulouts. These walruses may stampede in response to loud overflights, trampling and killing young and even adult walruses in the process. In addition, FWS officials noted that compared with personnel traversing terrain on foot, drones can avoid trampling sensitive habitats, including those with rare or endangered species.

Reduced collection of certain data

Some projects were cancelled, reduced in scope, or not initiated because of the costs or unsuitability of alternative methods, according to FWS, NPS, and USGS officials. This led to reduced collection of data on infrastructure, landscapes and natural resources, and wildlife. For example, according to bureau officials:

- During the grounding period, FWS was unable to collect high-resolution imagery of critical structures and facilities before storms, reducing the accuracy of post-storm analysis and resulting in longer, more costly repair of damaged facilities.

- In 2019, FWS used drones to monitor the lupine habitat of endangered Karner blue butterflies at the Necedah National Wildlife Refuge in Wisconsin. During the grounding of its noncompliant drones, FWS shifted to having two full-time employees conduct the monitoring on the ground for 3 months, which led to a reduction in the project's scope. An FWS official said that drones would have covered nine times the area compared with staff on foot.
- FWS cancelled a planned project to continue collecting low-altitude, high-resolution monitoring data for the Doty Ravine habitat restoration in California because alternative methods would have required cost-prohibitive fixed-wing aircraft.
- FWS cancelled a planned project to collect aerial images for restoration efforts after the Swan Lake Fire in Alaska, according to officials. The officials said that the area was not safe for working on foot due to numerous hazards.
- NPS was unable to survey sea turtles, resulting in loss of data on their populations and movement, according to a NPS official. The official stated that NPS lost long-term data collection and analysis that would have improved knowledge on the numbers of Kemp's ridley sea turtles—the world's most critically endangered sea turtle species.
- In fiscal year 2020, USGS cancelled its planned use of drones to assess the effects of recreational activities on the Maryland Heights cliff face at Harpers Ferry National Historical Park, according to bureau officials. The officials said the bureau had planned to generate virtual and physical models of the site using aerial imagery but cancelled the work because drones were the only available means of accessing and photographing the entirety of the cliff face.

Reduced cultural resources management efforts

Interior's mission includes protecting and managing the nation's cultural heritage and honoring its trust responsibilities or special commitments to American Indians, Alaska Natives, Native Hawaiians, and affiliated island communities. As part of this, BLM and NPS in particular are responsible for maintaining and preserving cultural and historic resources for present and future use and education.

However, Interior's drone policies reduced NPS's cultural resource monitoring and historic preservation programs due to the increased costs of alternative methods, according to a 2021 Interior report. For example, without compliant drones, NPS has been unable to survey cliff dwellings at Mesa Verde National Park in Colorado, historic Anasazi dwellings in Arizona, archeological sites in Pu‘uhonua o Hōnaunau National Historical Park in Hawaii, and ancient trails and trade routes within Organ Pipe Cactus National Monument in Arizona, according to NPS officials. The officials stated that NPS does not have sufficient resources to employ helicopters or fixed-wing aircraft to do this work.

Similarly, BLM has conducted no cultural resource monitoring with drones since 2019, bureau officials said. Previously, BLM's archaeology program had widely utilized the advantages of drones, according to an Interior document. The document stated that the size and nature of the sites that BLM managed paired perfectly with the capabilities of drones for delineating, recording, and monitoring cultural resources. BLM had found that gaining an aerial perspective to accurately map and assess cultural resource locations had become critical in complex landscapes, according to a BLM document.

Reduced public education and communication efforts

The elimination of nonemergency drone flights during the grounding period—and difficulty resuming them since—limited opportunities to use drones for public education and communication, according to bureau officials. Before fiscal year 2020, drones were part of most of BLM's program areas, and BLM viewed all the information collected and produced as an opportunity to educate people within and outside the bureau, according to BLM officials. However, the effects of Interior's grounding policies limited opportunities to use drones, including for public education and communication efforts, according to BLM officials. Similarly, USGS usually tries to include some video in its drone missions to help document its work for use in social media outreach and public relations, but public relations, education, and communications flights remain limited, according to USGS officials.

FWS officials noted that while the bureau has used drones to provide aerial videos or photos for public affairs, it would be rare to use a crewed aircraft to do so because of the high cost. For example, FWS cancelled a planned project in Alaska to collect aerial imagery for communicating with the public about a fish passage and streambank restoration project, according to FWS officials. The officials stated that such video is critical for communicating to the public about the benefits of the restoration, and that it is difficult to show how restoration changes streams over time without aerial views of entire areas.

NPS officials also said there were missed opportunities to use drones to collect aerial videos for park visitor centers, documentaries, and social media initiatives that would have showcased NPS efforts, as well as to monitor visitors' boating in Florida's Biscayne National Park, which is 95 percent water.

Fewer training flights and drone pilots

Interior's drone policies did not allow training flights between October 2019 and October 2022 except those necessary for emergency readiness. As a result, officials from BLM, FWS, and NPS told us their numbers of trained drone pilots fell because some staff were unable to meet the flight requirements. These bureaus' officials said their ability to train more pilots going forward depends on their ability to procure aircraft.

In contrast, USGS was able to maintain its numbers of drone pilots during the grounding, according to bureau officials. The officials said that after Interior's March 2021 memorandum, USGS's training flights related to natural hazards drone operations were characterized as emergency readiness flights and thus permissible. Officials said this change, combined with USGS leadership prioritizing pilot readiness, helped USGS staff maintain the number of trained drone pilots.

How have Interior's drone policies affected NOAA's drone operations?

NOAA altered or ceased some of the drone missions it conducted in partnership with Interior, operating on Interior-managed lands, in response to Interior's policies limiting use of noncompliant drones over these lands, according to NOAA officials. However, NOAA does not plan to procure drones with Interior's requirements in mind or adjust its mission planning in response to Interior's policies, according to NOAA officials.

Effects on missions. Interior's drone policies affected some of NOAA's drone missions that included launching from or landing on Interior-managed lands or waters, according to NOAA officials. These missions were mostly wildlife surveys conducted by the National Marine Fisheries Service, the officials said. For example, officials told us they halted an ongoing survey of seal and sea lion populations on NPS-managed land on San Miguel Island in California in 2021

and 2022 because Interior was not able to allow NOAA flights with noncompliant drones. However, officials told us they were able to modify some drones to be in compliance with Interior's policies and that, as a result, Interior approved a permit for the survey to resume in 2023.

Effects on procurement. NOAA has not planned for future flights on Interior-managed lands or how many compliant drones it might need for these missions, according to agency officials. Officials said NOAA's drone purchases do not take into account possible use over Interior-managed lands and waters, but that they have purchased some drones they believe comply with Interior's policy. NOAA officials noted that they have faced challenges similar to Interior's in procuring what they consider compliant drones: key technological capabilities that were not comparable and estimated costs that were two to six times higher.

NOAA has an exemption from many of the provisions of the American Security Drone Act of 2023 regarding foreign-made drones. However, NOAA officials told us the agency defers to Interior regarding whether NOAA flights over Interior-managed land will be subject to Interior's policy. Interior officials confirmed that NOAA operations will continue to be subject to Interior's policy prohibiting other federal agencies from operating noncompliant drones on Interior-managed lands.

How have Interior's drone policies affected nonfederal partners?

Bureau officials told us that Interior's drone policies have impacted partnerships with nonfederal entities. Bureaus have partnered with nonfederal entities, such as universities, to conduct a variety of missions using drones, including search and rescue, wildlife population monitoring, and archaeological site evaluations, according to bureau documents and officials. Under Interior's policies since January 2020, nonfederal partners who want to conduct drone operations over Interior-managed land must use compliant drones, but according to officials, these entities often do not have such drones. For example:

- FWS officials told us the University of New Mexico proposed using drones to collect images of waterfowl on FWS land to develop machine learning for waterfowl counting. However, because the project would not be using compliant drones, FWS officials said the bureau could not allow it to go forward.
- NPS partnered with the State University of New York in 2019, prior to the grounding period, to use drones at Isle Royale National Park in Michigan, according to NPS officials. The officials said that the project used drones to non-intrusively monitor the denning and other activities of wolves, and count the number of pups born annually, among other things. However, the university did not continue this drone project with NPS in subsequent years as planned, likely due to its lack of compliant drones, according to NPS officials.

Some bureau officials told us that denying these agreements could discourage future partnership applications or strain relationships with research institutions, among other effects.

Agency Comments

We provided a draft of this report to the Departments of the Interior and Commerce for review and comment. Both departments provided technical comments, which we incorporated as appropriate.

How GAO Did This Study

We reviewed statutes and presidential actions relevant to Interior's use of drones, including the American Security Drone Act of 2023, Presidential Determination No. 2019-13, and Executive Order 13981.

We reviewed documents and interviewed officials from Interior's Office of Aviation Services and the four selected Interior bureaus. We selected BLM, NPS, FWS, and USGS because they were the bureaus with the most drone flights, according to Interior's flight data. The experiences of these bureaus are not generalizable to the experiences of all Interior bureaus that fly drones; however, Interior's policies on certain foreign-made drones apply to all of its bureaus.

The documents we reviewed include Interior's strategic plan for fiscal years 2022 through 2026; Interior's and bureaus' general policies and guidance on aviation and drones; Interior's policies on certain foreign-made drones and associated implementation guidance; and Interior's and bureaus' reports or other documents on their drone use and the effects of Interior's policies on the bureaus' operations.

We also reviewed Interior's data on the number, cost, and dates of drones procured and the number of drone flights each fiscal year for 2017 through 2023. To assess the reliability of these data, we reviewed related documentation; examined the data for obvious errors, outliers, or missing data; and interviewed or obtained written responses from knowledgeable agency officials to our questions about the quality of the data and Interior's processes for collecting, storing, updating, and verifying these data. We determined the data were sufficiently reliable for describing the bureaus' drone purchases and flights. We adjusted the drone purchase costs for inflation, using the fiscal year 2023 Gross Domestic Product Price Index.

We interviewed and obtained written responses from bureau officials about their use of drones and the effects of Interior's drone policies on each bureau's drone fleet (including challenges the bureaus faced in procuring compliant drones), personnel, emergency and nonemergency flights, missions, and nonfederal partners. In addition, we asked agency officials about other factors, such as the COVID-19 pandemic, that could have contributed to changes in their drone operations after Interior's October 2019 email grounded nonemergency flights, to better understand the role of Interior's drone policies in these changes. We also reviewed Interior's drone flight data to assess trends in flights made between the October 2019 email and March 2020, when the President declared a nationwide emergency due to COVID-19.

We also interviewed a representative from a drone industry group to supplement information Interior provided us on the availability, costs, and advantages and disadvantages of compliant and noncompliant drones. We selected this group based on its representation of a large number of industry stakeholders and recommendations from GAO staff with expertise in drone issues. The views of this representative are not generalizable to other drone industry organizations.

We reviewed documents from NOAA, including the agency's fiscal years 2021 and 2022 drone use reports, 2022 drone handbook and operations policy, uncrewed systems strategic plan for 2021–2025, drone procurement data from the agency's asset management system, and the Department of Commerce's 2021 drone inventory report prepared pursuant to Executive Order 13981. We also interviewed and obtained written responses from officials with NOAA's Office of Marine and Aviation Operations; Office of General Counsel; National Marine Fisheries Service; National Weather Service; National Ocean Service; Office of Oceanic and Atmospheric Research; and National Environmental Satellite, Data, and Information Service. We discussed NOAA's use of drones, the agency's drone operations over Interior-managed lands and waters, and effects of Interior's policies on these operations, including challenges with procuring compliant drones.

We conducted this performance audit from June 2023 to September 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

List of Addressees

The Honorable Ted Cruz
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Roger F. Wicker
United States Senate

We are sending copies of this report to the appropriate congressional committees, the Secretary of the Interior, and the Secretary of Commerce. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

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Endnotes

[1]Interior's guidance on its use of uncrewed or unmanned aircraft systems (UAS) invokes the 14 C.F.R. regulations of the Federal Aviation Administration (FAA) and explains that those regulations apply to UAS. Department of the Interior, Office of Aviation Services, *DOI Use of Uncrewed Aircraft Systems (UAS)*, DOI Operational Procedures Memorandum (OPM)–11 (updated Dec. 14, 2023). This update of OPM-11 became effective on January 1, 2024. For the purposes of this report, we use the term "drone" to refer to an uncrewed or unmanned aircraft, which is defined by the FAA regulations to mean an aircraft without the possibility of direct human intervention from within or on the aircraft. Small unmanned (or uncrewed) aircraft are defined as weighing less than 55 pounds on takeoff, including everything that is on board or otherwise attached to the aircraft. A small uncrewed aircraft system is defined to consist of an unmanned aircraft and its associated elements—including the aircraft, the control station, and the associated communication links—that are required for safe and efficient operation in the national airspace system. 14 C.F.R. §§ 1.1, 107.3.

[2]Department of the Interior, Deputy Assistant Secretary for Policy, Management, and Budget, *Temporary non-emergency mission grounding of DOI UAS (drone) fleet,* email (Oct. 30, 2019).

[3]Specifically, the order grounded all nonemergency UAS flights pending an internal review and imposed restrictions on bureaus' and offices' purchases of, and their contractors' and grantees' uses of, designated UAS, including UAS with designated components. Secretary of the Interior, *Temporary Cessation of Non-Emergency Unmanned Aircraft Systems Fleet Operations*, Order 3379 (Jan. 29, 2020).

[4]Department of the Interior, Deputy Assistant Secretary for Public Safety, Resource Protection, and Emergency Management, *UAS Flights for Emergency Operations and Training: Amended Guidance Under Secretary's Order 3379*, memorandum (March 11, 2021).

[5]Department of the Interior, Deputy Assistant Secretary for Public Safety, Resource Protection, and Emergency Management, *Updated Uncrewed Aircraft Systems (UAS) operations and procurement policy*, memorandum (Oct. 21, 2022).

[6]"Foreign-made drones" in this context includes drones manufactured or assembled by certain foreign entities, as well as those containing certain transmission, collection, and control components. National Defense Authorization Act (NDAA) for Fiscal Year 2024, Pub. L. No. 118–31, div. A, tit. XVIII, subtit. B, §§ 1821–1833, 137 Stat 136, 691–699 (2023). The American Security Drone Act of 2023, which the president signed on December 22, 2023, is part of the NDAA for Fiscal Year 2024.

[7]Secretary of the Interior, *Temporary Cessation of Non-Emergency Unmanned Aircraft Systems Fleet Operations*, Order 3379 (Jan. 29, 2020) at § 4 (citing Presidential Determination No. 2019-13 of June 10, 2019, 84 Fed. Reg. 27701 (June 13, 2019)).

[8]Bureaus fund the purchase of drones for their individual bureaus, but Interior's Office of Aviation Services centrally manages the procurement of these models, according to Interior officials.

[9]Department of the Interior, Deputy Assistant Secretary for Public Safety, Resource Protection, and Emergency Management, *Updated Uncrewed Aircraft Systems (UAS) Operations and Procurement Policy*, memorandum (Oct. 21, 2022).

[10]White House, *Protecting the United States From Certain Unmanned Aircraft Systems*, Executive Order 13981 (Jan. 18, 2021), 86 Fed. Reg. 6821 (Jan. 22, 2021).

[11]Interior's memorandum states that "adversary country" is as defined by the Department of Commerce and referenced in Interior's Operational Procedures Memorandum-11.

[12]Pub. L. No. 118–31, §§ 1823(a), 1832, 1833, 137 Stat at 692, 699.

[13]Specifically, Interior officials said the policy prohibits external entities from launching or landing noncompliant drones on Interior-managed lands.

[14]*See* Pub. L. No. 118–31, §§ 1823(e), 1824(e), 1825(d), 137 Stat at 692–95. NOAA's exemptions are to be taken in consultation with the Secretary of Homeland Security.

[15]USGS conducted the bureau's first drone flight in 2004 and established its drone program in 2008; the other selected bureaus began using drones in 2012 (BLM and NPS) and 2017 (FWS), according to bureau officials.

[16]We evaluated procurement costs starting in fiscal year 2017 because Interior officials told us this was the beginning of a stage of greater maturity of its drone program, which was marked by

significantly increased drone flights and readily available off-the-shelf drones that met mission needs.

[17]See, for example, GAO, *Wildfire Smoke: Opportunities to Strengthen Federal Efforts to Manage Growing Risks,* GAO-23-104723 (Washington, D.C.: Mar. 13, 2023), *Wildland Fire: Barriers to Recruitment and Retention of Federal Wildland Firefighters*, GAO-23-105517 (Washington, D.C.: Nov. 17, 2022), and *Wildland Fire: Federal Agencies' Efforts to Reduce Wildland Fuels and Lower Risk to Communities and Ecosystems,* GAO-20-52 (Washington, D.C.: Dec. 19, 2019).

[18]GAO-23-105517.

[19]Department of the Interior, *Review of the U.S. Department of the Interior (DOI) Unmanned Aircraft Systems (UAS) Program* (May 30, 2021).