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Review

Management of Forests and Wildlife at the Wildland–Urban Interface in the Eastern United States

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Abstract

The wildland–urban interface (WUI) refers to areas where forests with little human influence and other vegetation types intersect with human development. Ecosystem management in the WUI presents special challenges. Human dwellings and other infrastructure can constrain management options, such as timber harvesting, prescribed burning, and managing wildlife. Humans can also negatively affect ecosystem functioning through the introduction of invasive plant and animal species, wildfire ignition, habitat fragmentation, and attracting nuisance wildlife species. Although there are WUIs throughout the world, this review will focus mostly on the eastern United States, where a high population density and maturing forests highlight exceptional challenges to forest management. Land ownership in the WUI in this region is dominated by non-industrial private forestlands with diverse ownership objectives and is often distributed in relatively small parcels, creating difficulties for coordinated forest management. Landowners and loggers often plan timber harvests without input from forest managers. On the frontlines of WUI management are extension agents, state and local agencies, non-government organizations, and consulting foresters. Public education, cost-share agreements, and local government engagement are needed to conserve and manage forests in the WUI.

Keywords: wildland urban interface; eastern U.S. forests; non-industrial private forestlands; wildfire; wildlife management; invasive species; habitat fragmentation

1. Introduction

Management of forest wildlife often focuses on relatively undeveloped wildland areas, such as national parks, wilderness areas, national forests, and other contiguous habitat types. Increasingly important for wildlife conservation and management is the spread of the wildland–urban interface (WUI). The WUI has been defined as a landscape where homes and other developed areas meet or intermingle with undeveloped wildland vegetation [1]. The WUI exists in gradients from more semi-urbanized areas, to suburban, and ex-urban landscapes. In ex-urban areas, the developed landscape may be mostly forested, but with homes and small farms imbedded within it. The WUI occurs in many areas throughout the world. Although the WUI covers only approximately 5% of the world's land surface, it contains half of the human population [2]. Temperate broadleaf and mixed forest biomes, including Europe, China, and eastern North America, have a high population density within the WUI [2]. Eastern forests in the eastern United States have undergone a 400-year history of widespread logging, clearing for agriculture, and forest recovery [3,4]. In this area, the WUI has been rapidly expanding in recent decades, with human infrastructure

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embedded within a recovered forest landscape [5,6], even around and sometimes within national forests [7].

Almost all aspects of current forests in this region differ from historical forests. Forests are now characterized by fragmentation and species composition that is a legacy of three centuries of human modification (both direct and indirect) [8,9]. Many formerly important species are missing, and the impacts of several exotic species have been substantial. The interplay of historical and novel forest ecology is concentrated in the WUI, where two fundamental questions are important to ask: what goes on within WUI landscapes, and how can we apply ecological insights to shape the WUI futures?

The WUI presents special problems for forest and wildlife management. Perhaps most important is that the WUI is very large and diverse in ownership. Within the 285 million ha of forestland in the U.S., 58% of land is in private ownership, often distributed among small parcels and where landowners have various management objectives [10]. In the eastern United States (defined here as East of the Mississippi River), up to 80% of forestland is privately owned [11,12]; a pattern that is not unique. For example, private forestland ownership comprises 69% in Finland, 85% in Austria, 77% in Chile, and 59% in Japan [10].

In most of the eastern U.S., the bulk of ownership of private forestlands is categorized as non-industrial private landowners (NIPF), which include homeowners with adjacent forestland, farmlands with forests, and non-government organizations including hunt clubs, scout camps, and private colleges, among others. For example, in Virginia, 60% of forestland is privately owned [13], often in parcels <50 ha and averaging only 5 ha. NIPF lands include those owned by absentee landowners [11].

In the past few decades in the U.S., the nature of private forestland ownership changed when forest industries sold their land to timber management investment organizations (TIMOs) or real-estate investment trusts (REITs) [14,15]. These ownerships hold forestland in speculation of future sale and conversion to development, increasing fragmentation in the WUI.

Landowners within the WUI in the U.S. often rank conserving and viewing wildlife as a primary management objective [16], but forest wildlife management on WUIs faces many challenges. Small ownership parcels that cause habitat fragmentation are particularly problematic for wildlife management [17,18]. Forest wildlife can damage property, carry disease, and prey on pets and livestock. Timber harvests and other forest management activities can affect wildlife species diversity and composition, as can the amount of human development within a landscape [19].

This review focuses on the WUI forests of the eastern U.S., of which I am most familiar, but will search beyond this region for other applicable studies. Major issues for management and wildlife conservation in the WUI include habitat fragmentation and degradation, selective logging that often results in high grading (removing the most valuable stems and leaving the worst), the spread of invasive species, the use of or lack of fire, and the reliance on hunting to control certain populations of wildlife. In examining these issues, I also present potential management applications that may promote wildlife diversity in the WUI and minimize human–wildlife conflicts.

2. Habitat Fragmentation and Degradation

The nature of forests within the WUI is defined by some degree of habitat fragmentation. Fragmentation occurs when contiguous areas of forest have areas within them that are deforested either temporarily or permanently. In some cases, forested areas are no longer the primary feature of the landscape and may be only small, isolated forest patches or even linear "shreds", such as forests along riparian areas, fencerows, or the 'green curtains' sometimes retained by forest industries. Fragmentation creates edge habitats between forests and non-forested areas. These habitats have modified microclimates which impact both plants and animals. Generally, a higher degree of forest fragmentation results in a higher amount of edges and edge habitats in a landscape [20,21]. Edges between forest and non-forest areas and their adjoining areas of influence (ecotones) can be beneficial to many wildlife species, often called "edge species." On the other hand, it can create unsuitable habitats for species that prefer forest habitats away from edges. These species are often called "forest-interior species" or "area-sensitive species" [3].

Many game species in the eastern United States have increased, often due to fragmentation and edge creation, among other factors [3,21]. These include popular game species such as the White-Tailed Deer (*Odocoileus virginianus*), Wild Turkey (*Meleagris gallopavo*), Bobwhite Quail (*Colinus virginianus*), and Cottontail Rabbit (*Sylvilagus floridanus*). The creation of edges to promote game species was a major focus of the first text on wildlife management written by Aldo Leopold [22]. Although an increase in these game species benefits hunters, it can also create problems for landowners in the WUI, particularly where hunting may not be allowed to control their populations.

Fragmentation also has favored populations of medium-sized omnivores and carnivores, often called "mesopredators" [23,24]. Like White-Tailed Deer, these species have benefitted from the loss of large predators in eastern U.S. forests, particularly the Gray Wolf (*Canis lupus*) and Mountain Lion (*Felis concolor*). Mesopredators include, among others, Raccoon (*Procyon lotor*), Eastern Coyote (*Canis lupus*), Striped Skunk (*Mephitis mephitis*), Virginia Opossum (*Didelphis virginiana*), domestic and feral cats, and various Canids (e.g., foxes) and Mustelids (weasels) [25]. Most of these species prey heavily on bird nests, small mammals, amphibians, and reptiles on forest edges. Songbird species are threatened by other bird species, such as Crows (*Corvus* spp.) and Blue Jays (*Cyanocitta cristata*) that prey on eggs and nestlings [24]. Populations of Brown-Headed Cowbird (*Molothrus ater*), a brood parasite, increase with forest fragmentation [26,27], with steep declines in populations of vulnerable songbird species that are particularly vulnerable resulting in steep declines in populations [28]. Snake species that often frequent edge habitats and climb trees, such as the Eastern Rat Snake (*Pantherophis alleghaniensis*), also prey on bird eggs and nestlings [29]. The abundance of these edge predators is apparent from the number of them recorded as road kill within the WUI [30], as well as the number of orphaned animals taken to wildlife rehabilitation facilities [31].

Fragmentation and associated wildlife roadkill are also a major cause of population decline in many species. The Woodland Box Turtle (*Terrapene carolina*) is a common tortoise throughout eastern North America. The slow movement of this species and its behavior to retire into its shell make for a long journey across a busy road, resulting in a large number of WUI road kills [32,33]. Turtles are also often taken from the wild as pets and may be preyed upon by domestic dogs in the WUI [33]. Female turtles are often killed by mowing when they seek out sunlit areas for basking and egg laying [34]. Emerging nestlings are highly vulnerable to edge predators. Similarly, female pond turtles face similar threats because they leave ponds to lay eggs, often making them, and any subsequently emerging nestlings, vulnerable to roadkill and other sources of mortality [35].

3. Logging

Landowners within the WUI, especially NIPFs, often have strong and diverging views of logging of their forestland [12,36]. Some do not harvest timber on their lands for esthetic reasons while others are open to harvesting, particularly when sudden economic emergencies can be resolved by selling timber. Most decisions about logging are made between landowners and private logging companies, rarely involving advice or supervision

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by trained foresters or wildlife managers, despite the often free or low-cost services of state and federal agencies or forestry consultants [37].

My own experience with NIPF owners in Virginia is that they prefer selective logging as opposed to clearcutting or other even-aged management, unless they are selling their property for development. Loggers, who the landowners commission to harvest timber, are more than willing to selectively harvest timber (high-grading) because they can make more income on cutting only the most marketable trees. Such harvests often reduce the long-term ecological integrity and economic value of the forest.

Numerous timber stand improvement treatments are known that can improve forest composition and timber quality on NIPF lands [38,39]. These silvicultural interventions can be carried out by landowners or contractors and also provide intermediate products such as firewood, biomass chips, pulpwood, or carbon credits [40]. They may also improve the esthetics of forest stands [36].

Regeneration of overstory trees is also an important issue on NIPF lands. Understory and overstory shade can reduce regeneration of shade-intolerant and gap-phase tree species [41], as well as savanna tree species such as Longleaf Pine [42]. Timber stand improvement treatments with prescribed burning remove low-value trees and leaf litter that impede forest growth and also inhibit tree regeneration by casting overstory and understory shade (Figure 1). Prescribed burns following timber stand improvement treatments can stimulate the establishment of high-value timber species, such as Tuliptree (*Liriodendron tulipifera*) (Figure 2). White-Tailed Deer browsing in the WUI can impede the establishment of seedlings and saplings, as well as encourage invasive species [43,44].

Figure 1. Regeneration of trees after timber stand improvement treatment and a controlled burn on a private property within the wildland–urban interface in Virginia (photo by T.S. Fredericksen).

Figure 2. Tuliptree (*Liriodendron tulipifera*) seedlings established after timber stand improvement and prescribed burning in a Virginia forest. Burning in the spring allowed for seedling establishment. Photo was taken the next spring following leaf fall (photo by T.S. Fredericksen).

Wildlife species respond differently to habitat modifications caused by logging, including decreased overstory cover, increased ground vegetation cover, inputs of large woody debris, and changes in food resource availability [45–47]. Opening the canopy of the forest during logging can reduce habitat quality for later successional species, but a study on wildlife responses to harvesting in eastern Pennsylvania and southwestern Virginia showed an increase in many types of wildlife on logged lands compared to unlogged controls [48–50]. For example, small mammal abundance and diversity increased after logging and were related to an increase in understory cover and the amount of coarse woody debris [51]. Similarly, bird species richness and diversity were higher on logged stands as well as reptile abundance [52,53].

4. Invasive Species

Landowners embedded in forest landscapes often introduce or create habitats for invasive plant species [54–56]. Many of these species mostly invade along forest edges [57], but that process varies with the edge structure [58,59]. Yet, some species, such as Garlic Mustard (*Alliaria petiolata*), Autumn Olive (*Elaeagnus umbellata*), and Japanese Stiltgrass (*Microstegium vimineum*), can colonize forest understories, impede forest regeneration, and reduce wildlife habitat quality. Other species can infiltrate well from the edge of forests if light penetration increases due to windthrow, fire, or logging [44]. Tree-of-Heaven (*Ailanthus altissima*), a light-demanding and prolific producer of wind-dispersed seeds, often invades forest edges [60]. It also produces allelopathic chemicals that impede the germination and establishment of other species [60,61]. If selective logging occurs within the adjacent forest, the species can spread into forest gaps within the forest interior.

Invasive plant species are often very difficult to control because of the lack of natural pests and pathogens, as well as their ability to sprout from well-established root systems. Kudzu (*Pueraria montana*) is not only a prolific seed producer but also has a large root biomass that can quickly regenerate by sprouting after a fire or mechanical cutting [62]. Herbicides are effective, but only if applied repeatedly. Repeated browsing by goats or cattle is another option [63]. After a fire, the seed bank of the species is stimulated and can create a carpet of new seedlings, impeding regeneration (personal observation by author). As a climbing vine, Kudzu can envelope the canopy of trees, killing them by blocking sunlight and then spreading further from the forest edge.

5. Fire

When human structures are embedded within forests, wildfire is a threat to human safety and property [64–66]. Although the threat of wildfire is less of a threat in the more humid eastern forests compared to other more wildfire-prone areas of the planet, a warming climate and higher human population density make the threat of wildfire in the WUI important [67]. Of all people living near 2003–2020 wildfires (0.4 billion), two-thirds have their home in the WUI [2]. Sun et al. (2025) [66] found that approximately 80% of suppression expenditures are for WUI fires in British Columbia, Canada.

Managing wildfires in the WUI presents several complications. People often choose to build homes in fire-prone ecosystems for esthetic reasons. NIPF landowners value the scenic and recreational value of their forests and for attracting, hunting, or viewing forest wildlife [37,68]. Because of the proximity of homes and other structures to forests, wildfire management and suppression are important, depending on the climate and forest type. This situation may lead to increased fuel accumulation in forests, leading to increased fire risk, or an increase in fire-resistant forests because shade from fire-intolerant species increases and makes fire less likely to occur (mesophication) [69]. Mesophication can lead to a change in forest composition where fire-tolerant species such as Oaks (*Quercus* spp.) or certain pines (*Pinus* spp.) are replaced by thin-barked fire-intolerant species such as Red Maple (*Acer rubrum*) and American Beech (*Fagus grandifolia*) [70]. Although mesophication may reduce the risk of wildfires, it does not preclude a wildfire event during periods of drought and other weather that can lead to a wildfire (heat, high winds, low humidity) [71]. Unlike the relatively moist eastern deciduous forests, climate change is exacerbating fire danger in the drier fire-prone forests and shrublands in the western states [72,73]. Public attention to wildfire danger in the WUI in western states has increased with highly publicized destruction of entire towns, such as Paradise, California [74].

Prescribed burning has been increasingly embraced by forest managers for a variety of objectives including fuel reduction, site preparation, control of species composition, reduction in invasive plant species, and wildlife habitat improvement. In the eastern U.S., prescribed fire is an important management tool for the maintenance and restoration of Longleaf Pine (*Pinus palustris*) forests and savannas in Coastal Plain Ecosystems [75]. The species is adapted to fire because it has thick bark and a "grass stage" seedling/sapling part of its life cycle where the terminal bud is protected from fire by thick needles and it rapidly grows to heights above the ground following fire. Like most pines, its seeds are small and germinate and grow best on exposed mineral soils following fire. Without fire, shade-intolerant Longleaf Pine stands may be invaded by hardwood species which may eventually overtop them [76].

Oak species also benefit from fire because their thick bark protects them from fire, and their deep rooting allows rapid resprouting of top-killed younger trees [77]. A shelterwood system involving prescribed fire has been developed to effectively regenerate oak-dominated forests where a selection harvest removes about half of the basal area and midstory removal provides some shelter for new seedlings. Controlled burning is then implemented to foster advanced oak regeneration over shade-tolerant competing species [78].

Prescribed burning, particularly in southeastern states, has been used extensively for site preparation of Loblolly Pine (*Pinus taeda*). Burns, sometimes in association with pre-burning herbicide application, remove logging slash and reduce competing vegetation prior to planting pine seedlings. Cain [79] suggested that these burns are feasible on small forest properties.

Controlled burning is a highly effective, cost-efficient tool to maintain and improve wildlife habitats for many fire-adapted species. Burning improves foraging habitats for game species such as Northern Bobwhite Quail, White-Tailed Deer, and Wild Turkey [80,81]. Along with other silvicultural tools, in the right places, it can also maintain and restore habitat structure that is important for birds and other species dependent on early successional grassland and shrublands [82].

Although silvicultural burns have been proven to be effective, their feasibility depends on their location with respect to the WUI. There is still widespread opposition to burning among the public for several reasons. First is the historical public support of fire suppression stemming from historical wildfires in the late 19th century and early 20th century in the United States, which consumed large areas of forests and burned entire towns. Examples include the 1910 "Big Blow-up" wildfires in the Pacific Northwest and the Great Peshtigo Fire in Wisconsin [83]. The iconic "Smokey Bear" character was widely used in publicity campaigns, admonishing the public that "only you can prevent forest fires" [84]. The National Forest Service implemented the 10 a.m. fire rule using fire towers and other surveillance measures to attempt to extinguish fires that were detected by 10 a.m. the next day [85]. Even at the local level in the WUI, public safety services provided by fire departments and state forestry agencies are normally oriented towards fire suppression rather than the use of fire to prevent future fires [86]. This is understandable given the perception of fire among the general public and restrictions on lighting fires within the WUI.

Fire suppression was effective throughout the United States but led to the accumulation of fuel, especially in fire-prone forests in western North America [87]. Fuel loading has led to increasingly intense fires that may spread from wildlands into the WUI [83,88]. North et al. [89] noted that fire suppression has resulted in reducing the carbon sink of forests by reducing stocks of large trees and contributing to emissions from inevitable larger wildfires, including "megafires", which are so large that they cannot be effectively controlled by conventional firefighting methods and are increasingly likely due to climate change [90]. They are also defined by their socioeconomic impacts because they have major costs in loss of property and fire suppression, mostly concentrated in the WUI [91,92].

Although wildfires can be ignited by lightning, most are ignited by humans [65]. There is a wide variety of these sources, such as arson, escaped campfires, discarded lit cigarettes, fallen powerlines, and debris burning. Escaped wildfires from prescribed (controlled) burns also occur and attract much attention and criticism of prescribed burning [93]. Some high-profile escaped prescribed burns in New Mexico and other states cast doubt on the safety of this practice [94]. Such fear of possible fire escape is particularly high when fires occur within or near the WUI [95].

In addition to the fear of the spread of fire from controlled burns, local residents and businesses in the WUI have concerns about smoke from these fires, which, depending on wind direction and other weather conditions, can be dispersed from the burn sites to adjoining areas [96]. Public officials may also be concerned about smoke impacts close to public roads, towns, and schools. Smoke management is an important consideration when implementing prescribed burns in the WUI [97,98]. These practices include consideration of wind direction, mixing height (allowing for more effective smoke dispersal), and fuel moisture (wetter fuels tend to produce more smoke). Duration of the burn may also impact smoke dispersal. Fires that linger into the night create more smoke near the surface due to temperature inversions. Because of these concerns, some community ordinances outlaw forest burning, although some other communities have established a "right to burn" policy [99].

Some U.S. state agencies restrict any burning during certain seasons of the year. For example, the State of Virginia established spring and fall fire seasons (Virginia Department of Forestry, https://dof.virginia.gov/, accessed on 6 August 2026). In the spring fire season from 15 February to 30 April, no fires are allowed in or near forests until after 4 p.m., when the atmospheric conditions are less likely to cause the spread of fire. The fall fire season extends from 15 October to 30 November, when the public is made aware of enhanced fire danger, but does not include the after 4 p.m. burn restriction. Regardless of these restrictions, the Virginia Department of Forestry can declare a "red flag" warning of enhanced fire danger on any day of the year because of weather conditions that prohibit any outdoor burning in certain counties or regions of the state.

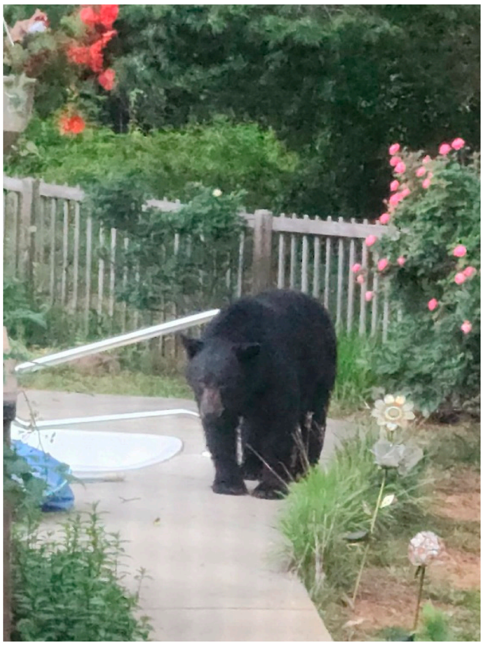
Mitigation of wildfire damage risk in the WUI includes many options [100]. Landowners near forests can protect their homes and other assets from fire by creating "defensible space", an area around the home that lacks fuel for a fire. Because of the threat of fire, the (www.nfps.org, accessed on 6 August 2026) is a non-governmental organization based in the United States that has developed the Firewise program. Cohen [83] termed the area near homes that need defensible space the "home ignition zone" (HIV). The program recommends removal of flammable materials on or adjacent to homes, such as removal of leaf litter from roofs or gutters and flammable plants, mulch, and firewood close to a home. Further from the home, there are recommendations to remove fuel near propane tanks, install spark arresters, create mowed strips, or create other barriers to fire intrusion such as walkways and patios (www.nfps.org, accessed on 6 August 2026). Green fire breaks have also been proposed to reduce the threat to human structures [101]. Costs of WUI codes and recommended standards for new construction have been detailed in some municipalities [102]. Sun et al. [103] recommended removing more flammable coniferous trees in western North America. Building design is also an option with the installation of fire-resistant roofing and siding materials. Vacca et al. [104] advocated for a performance-based approach for wildfire risk for homeowners in the WUI in Europe.

6. Nuisance Wildlife

The spread of the WUI and resultant habitat fragmentation brings humans and wildlife in closer contact [105–107]. Although encountering more wildlife may be a positive experience for many landowners in the WUI, it is also a major source of human–wildlife conflict [108]. Most of the animals that damage property, kill livestock, or pose direct or indirect threats to human health and safety are edge species [3].

One of the species that causes the most damage in the eastern U.S. is the White-Tailed Deer. Deer consume landscape and garden plants around homes and are also a leading cause of property damage and human injury from vehicle collisions. In addition, deer can spread disease to humans through tick-borne diseases because deer are a major alternate host for ticks. The increase in deer populations in the WUI may be implicated in an increase in Lyme disease, Rocky Mountain Spotted fever, Ehrlichiosis, and Alpha-Gal syndrome [109]. Deer can also seriously impede forest regeneration (e.g., Alverson et al., [110]). Within the WUI, many landowners prohibit hunting, which may also be restricted by local ordinances and firearm laws. In mature forest patches, a combination of shade and deer browsing pressure combine to inhibit seedling and sapling growth [44]. With the loss of their major natural predators, Gray Wolf (*Canis lupus*) and Mountain Lion (*Puma concolor*), control of White-Tailed Deer populations mostly relies on hunters. The number of hunters for deer and other game species, however, is declining [111]. Predators aside, the WUI mosaic is an ideal habitat for an edge species such as the White-Tailed Deer.

Black Bear (*Ursus americana*) populations have been increasing in the eastern U.S. as forests recovered and restrictions on uncontrolled hunting have been implemented [112]. Black bears may threaten humans but are more often responsible for a large amount of damage to poultry, field crops and gardens, and bee hives [113]. Black bear encounters are increasingly common in the WUI (Figure 3a,b). Although they are not nearly as common as deer collisions, damage to vehicles and human injury also occur with bears. In the WUI, black bear control is difficult because of hunting restrictions, but regulated hunting may be a viable option which may reduce the need for euthanizing animals and reduce bear–vehicle collisions [114].



(**a**)

(**b**)

Figure 3. (**a**,**b**). An adult black bear walking around a pool on a property in the WUI. Damage by the bear tearing the door off of a shed to get to horse feed (photos by Nell Fredericksen).

Martin and Burton [115] reported an increase in social media posts in a community in Canada about reporting the presence of bears and sharing information about nuisance animals in order to avoid conflict with wildlife. In Virginia, the growing bear population motivated the state's Department of Wildlife Resources to initiate a public education campaign on how to live alongside bear populations in the WUI.

Another major class of nuisance wildlife is the medium-sized opportunist omnivores that benefit from forest fragmentation [23,116]. They include previously mentioned Coyote, Raccoon, Striped Skunk, and Virginia Opossum. Coyote populations have infiltrated eastern forest landscapes from the western U.S. and have adapted well to life in the WUI with its abundance of small- and medium-size animals, but are also attracted to human dwellings to scavenge for outside pet food and garbage scraps. They have been known to take domestic pets and small farm animals [117]. Raccoons, skunks, and opossums can also be a nuisance around homes, scavenging for food or eggs of domestic chickens, but they can also take up residence inside human dwellings [23] Mesopredators are also major carriers of rabies and other diseases that they can spread to humans and pets [118,119].

Simple measures for landowners, such as feeding pets indoors, securing trash bins, and keeping animals indoors, can help reduce problems with bears and mesopredators. In other cases, investment may be needed to fence out wildlife from gardens and beehives. Mesopredator control is another option. Control efforts by private contractors or state or local government animal control offices normally target specific nuisance animals around homes, but wider trapping and removal by community groups or wildlife clubs can occur. These efforts typically need to be sustained to have more than just a short-term decrease in mesopredators [120]. Also, trapping could pose a risk to non-target animals.

Other species in the WUI find shelter in human homes, including bats, mice, and squirrels, which can spread disease and also damage the interior of dwellings [121]. Rodents are prone to gnaw on wood and even electrical wiring. Rabbits are also common in the WUI and can raid vegetable gardens and girdle fruit trees [122]. Groundhogs (*Marmota monax*) can devastate home gardens and create problems for farmers [123].

Although some landowners in the WUI fear and dislike wildlife, especially large carnivores and nuisance animals, I have found that most others appreciate wildlife, enjoy viewing them, and are interested in their conservation. Although there are also many public education problems in dealing with wildlife conflict in the WUI, public agencies could do more to help with education programs to help mitigate human–wildlife conflict and build trust with these agencies when wildlife control measures are needed. Non-government organizations, colleges and universities, and community groups, such as Master Naturalist Chapters, are also important in this endeavor. As Martin and Burton [115] point out, coexistence with wildlife in the WUI is important, as well as addressing issues about public attitudes about human–wildlife conflict.

7. Conclusions and Management Recommendations

The size of the WUI and complexity of ownership types and management issues and objectives make it difficult to provide uniform recommendations for WUI forest management. The WUI includes some of the most diverse forests, not just in terms of species, but especially with factors that shape present and future composition and dynamics. This means there can be no broad management solutions in the WUI, in general. There is a need to apply management that is informed by local issues. For example, eastern forests are embedded in different landscapes. For example, forests embedded within suburban areas will have different management solutions than those within more rural agricultural landscapes.

On the widest scale, it is important to recognize the need for land-use planning and controlling urban and suburban sprawl [1]. The WUI is a unique social–ecological zone [124] that requires new and innovative policy and management tools.

The promotion and adoption of conservation easements could contribute to reducing urban sprawl and the growth of the WUI. Conservation easements involve landowners who voluntarily agree to donate or sell a portion of their property rights to a qualified third party that is written into the deed of their property. Landowners have the satisfaction of protecting their property from future development and typically receive tax breaks and, in some cases, incentives in the form of government or third-party payments. Conservation easements are particularly important in eastern forests of North America where there is high population density and habitat fragmentation. They can protect some forests from the impact of predatory logging, and because the easements are written into the deed of the property, they cannot be changed if the property is transferred to another owner.

A survey of landowners by Sun et al. [103] found that easement adoption was higher among landowners possessing non-commodity ownership objectives, such as wildlife protection, while adoption was lower among landowners who had timber and investment objectives. The demand for conserving forestland was higher in areas with higher population growth and higher household income. State agencies and non-government organizations that promote conservation easements play an important role in adoption by landowners. The American Tree Farm System is an NGO that promotes forest stewardship for private forest landowners and can also facilitate third-party certification for conservation easements (https://treefarmsystem.org/, accessed on 6 August 2026).

On the frontline of forest management in the WUI are state and local government organizations, particularly extension offices and local forest and wildlife professionals, who can help the public with management problems on their properties. They often offer free consultation and cost-sharing programs for landowners to implement silvicultural practices to improve forest growth and species composition, manage wildfire, promote wildlife conservation, and control nuisance and invasive species. More financial and technical support for these agencies may be the best strategy for managing forests at the wildland–urban interface.

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