

Fishers (*Pekania pennanti*) are a member of the Mustelidae family native to the Northern areas of North America. Though they once covered much of Canada and the northern US, their range now only covers a smaller region of Canada with scattered populations in the US (USDA). One of these regions no longer inhabited by Fishers is the Pacific Northwest, where fishers have been completely extirpated from the region. Reintroduction efforts of fishers have been attempted in the region, though results have been mixed at best. However, fishers seem to be thriving in other regions such as Albany. The question is, what is causing this strange difference between fisher success across these regions?

Fishers have long had an interesting ecological history. During the height of the fur trade, fishers were a major target for their pelts. Their low densities and reproductive rates makes them highly susceptible to overhunting (Aubry et al 2003), which led to them obtaining the status of “endangered” during the 18th and 19th centuries. Not only did they lose numbers overall though, but they even became completely extirpated from certain regions. The Pacific Northwest is one of said regions, and populations of British Columbia are at risk of extirpation in the near future (Fogarty et al 2022). Though the fur trade of fishers has been given more regulations to prevent more overhunting, most of the damage has already been done. And it wasn’t just hunting that caused their dwindling numbers either. Fishers are forest obligates, relying on large ranges of old-growth forests as their habitats. However, many old-growth forests have suffered increasing declines as logging and, in some regions, wildfires cause their coverage to shrink. The Pacific Northwest is no stranger to this; since European settlement, around 72% of the original old-growth conifer forests in the region has been lost from logging efforts (Strittholt et al 2006). The forest that did remain ended up as small fragments and patches, limiting the range of fishers even more as travel between suitable habitats became difficult. This lack of usable area for fishers meant that populations were not able to keep up sustaining numbers, and new fishers could not migrate to the suitable patches due to distance and lack of a good corridor habitat.

Even though fishers haven’t been able to reestablish populations in the northwest naturally, there have been attempts to reintroduce them to the region through human intervention. Fisher reintroductions have been occurring since 2008, with the first project being the Olympic Fisher Reintroduction Project. In this project, about 100 fishers were reintroduced to the olympic peninsula over a three year period, and reported the final status of their population at the end of the third year. Unfortunately, this project was not successful; half of the introduced fishers were

reported as dead, and most of the other half were of an unknown status (Lewis et al 2011). In the end, the project wasn't a success, but that doesn't mean efforts were stopped because of it. The final report concluded that future work will analyze the data of the project to figure out how to manage a fisher reintroduction better, and future projects continued even past 2014. Some small areas have even had populations able to reestablish, such as those reintroduced to the Olympic peninsula in recent years (Washington Department of Fish and Wildlife). However, these populations are still small in numbers and have not expanded far from their initial release area.

The question is, why is fisher reintroduction such a struggle in the northwest? As stated before, old-growth forests have taken away much of the preferred habitat of fishers. However, there are other regions that fishers seem to be doing just fine in that have also experienced heavy logging, such as Albany. So what could set the Pacific northwest apart? Well for one, while direct fisher trapping has been stopped in the region, that does not mean they aren't harmed at all anymore by other trapping efforts. Incidental poisoning from control of other predators has been known to cause fisher declines in other regions, and is often suspected of doing the same in the Pacific (Aubry et al 2003). But it's even possible that there are factors outside of human activity that are preventing fishers from reestablishing. Some believe that the issue could be larger predators. However, there's no concrete data to suggest this, and it's generally agreed by experts that this is not a factor to consider (Lewis 2022). The American marten (*Martes americana*), is another member of the family Mustelidae, and it has been thriving in the Pacific northwest even in recent years. While they aren't as numerous as before, being detected only around 5% of the region proportionally (Zielinski et al 2001), they have been able to persist in the region even through fur trapping efforts. The thing about martens is that they share an ecological niche with fishers. They overlap in preferred habitat, distribution, even in their feeding habits. The two even share the same methods of foraging and hunting, both being cursorial and arboreal hunters (Zielinski et al 2004). Because of this overlap, it's possible that American martens are preventing fishers from reestablishing in the Pacific northwest through niche compression. Niche compression is the idea that when two species that share an ecological niche overlap in range, one will outperform the other via restricting them to a fundamental niche. Given that martens can persist in the northwest, it's possible that they are able to outcompete fishers in the region and keep any of the small populations present limited in their niche space. Even though martens have been known to get outcompeted by fishers in other regions such as Wisconsin (Manlick et al

2017), it's possible that it could be the inverse effect in the northwest. More direct research into matter should be conducted.

The struggle for fishers in the northwest does not appear to be the struggle for all fisher populations across the US. Namely, the Albany population of fishers have been booming, almost to the point of being *too* populated. But what makes this bizarre is that the fishers have been able to thrive without much access to their preferred habitat, old-growth forests. So how have they been able to do so well for themselves there? Well, it might be surprising to hear that until recently, fishers were actually a rare sight in the Albany region. They were even considered rare as recently as the 1990s, and experts say they've only really entered the suburban area in the last ten years (All Over Albany 2009). Because of this, it's more than likely that the prey species in the region have become naive to the threat of fishers. This could especially be the case of arboreal species like squirrels and songbirds, who are used to being able to escape in the trees and may be unprepared to handle a predator just as capable of chasing them up. But on the other hand, this could also end up being their eventual downfall in the region. This exceptional success in hunting can easily lead to them overpowering their prey's populations, making them too long to support a large population size. This will, in turn, lead to the fisher population of Albany crashing from a lack of food. While it most likely won't lead to a complete extirpation of fishers from the area, it'll likely leave the population at a more moderate and consistent level in the near future.

Another advantage fishers in Albany have is a seemingly innate adaptation to living in an urban and suburban environment. Like most city-dwelling animals, fishers have learned to adjust their active hours to avoid interacting directly with humans, meaning that Albany fishers have become more nocturnal than their forest-dwelling counterparts. However, they've also learned how to change their activity in more ways than just their active hours. Namely, urban fishers have begun using the natural corridors of cities in order to traverse large areas of territory without being detected by humans (LaPoint 2013). This can allow some fishers to continue their normal activities during daylight hours instead of changing their active hours. This can also help limit interspecific competition, as some fishers will adapt for use of the corridors while others simply change their usual active hours. Either way, these strategies both aid fishers in limiting human contact, meaning they can continue to exist without much cause of concern from humans of their activities, meaning less desire by humans to have them removed or controlled.

With all this said, could there be any other factors preventing fishers from reestablishing in the northwest while they have no problem settling in Albany? Of course, these possibilities don't have much study in these regards. One possibility could be an issue with parasites. When reintroducing a species to a region, there's always potential that the individuals being brought in could carry parasites from their original region. Most fishers used in reintroduction projects of the Pacific northwest, especially the earlier ones, come from the British Columbia province of Canada (Lewis et al 2011). Canadian fishers are no strangers to suffering from parasites. In Manitoba, Canada alone, seven species of helminths are known parasites on fishers, one of which even depends on the density of the population (Dick et al 1979). Though not the same region, it's important to recognize that parasites are an issue that fishers have to handle in Canada. More research into potential parasites of British Columbia fishers should be done, so that future reintroduction projects can use this to examine the individuals they bring to the northwest for said parasites to prevent reintroduced populations from being decimated by parasites before they can establish a breeding population. It could also inadvertently help in keeping invasive species from possibly entering the region as well.

Another potential factor not completely studied goes back to martens. While niche compression between the species has been studied, habitat use in comparison between the two is notably less so. There is some knowledge in the area, such as how fishers in Oregon do well in areas of low snowfall, while martens are the inverse (Hiller 2015). However, there's little knowledge on how either species of the region can handle urban environments. It's possible that martens in the northwest may have been able to adapt to more urban settings similarly to fishers in Albany, and that's how they've been able to persist in the region even in times of less optimal conditions. It would also explain why martens have been able to outperform fishers in the northwest while it's the opposite in other regions. The martens have naturally expanded into the region, meaning they had time to learn and adapt to the unique urban settings available there. However, the fishers being introduced still have to acclimate to a new area, much less a whole new environment, plus they're from populations that live in heavily wooded areas without much direct human interference. They're naturally less adept at handling human presences and man-made environments. More research in this area could yield valuable results.

Fishers struggling to reestablish in the Pacific northwest is not an issue with a definitive answer; there are multiple factors both understood and not that need to be considered. There's the

history of intense hunting for furs of the species, the logging of old-growth forests in the region, the niche compression from american martens also populating the area. Understanding these factors and how they play into each other is important for learning how fishers can be reintroduced to the region and be capable of establishing a breeding population again. Moreover, looking at other fisher populations, like those found in Albany, can help us see how fishers can adapt to survive even in more sub-optimal conditions, and how we may be able to get existing fisher populations in the northwest to adapt in these ways. With such a deep conservation history, fisher reintroduction to the northwest and other extirpated regions will be no easy task. It may not even be something achieved in this generation. However, with time, effort, and creating a fundamental groundwork, fisher populations can be brought back to at least partially what they once stood at.

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