“Super-Predator” Humans Kill More Than Was Known

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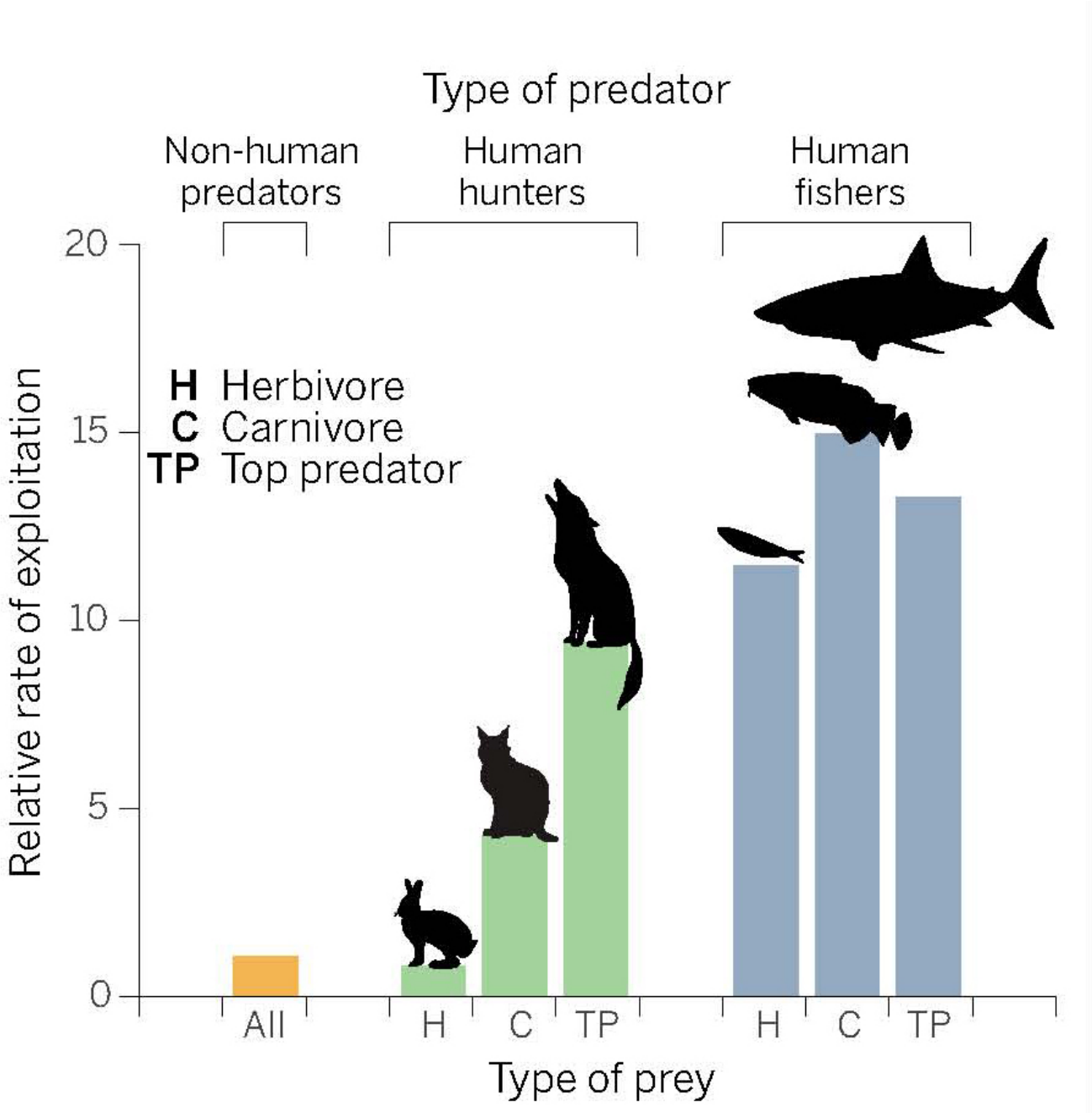

Humans are “super-predators” who kill adult land carnivores like bears and lions at nine times the rate that land carnivores do, and kill adult fish at 14 times the rate that marine predators do, says new research in *Science.* [1]

This makes us unique among all other carnivores, who eat juveniles, according to the team of lead author Chris Darimont, Ph.D., a University of Victoria geologist. It means we impact the environment even more than we thought, since humans’ prey are in their reproductive prime, which can turn widespread killing into widespread

extinction, and prompt the restructuring of land and sea ecosystems.

“We predicted humans would 'take more than the lions' share,'’ Darimont told *Bioscience Technology*. “But the magnitude of the difference in predation rates between human and nonhuman predator surprised us.”

Franck Courchamp, Ph.D., told *Bioscience Technology*: “This is a very good paper, analyzing an enormous amount of data to show the impact of humans on our environment in a very original way: as predators.” Courchamp, a director of research with the French National Centre for Scientific Research, was one of the peer-reviewers of the paper for *Science*. “We know now how important predators are for entire ecosystems and what deep impact they can have on all species that live in them, regardless of direct impact.”

2,125 species examined

Darimont’s crew examined 2,125 predatory land and marine species of predators worldwide. They found humans kill reproductive-age adults of other species up to 14 times more than other predators do. They also found humans most intensively killed off terrestrial carnivores and fishes.

Read More: We Gain 20,000 Species Yearly—But Lose More Than That [2]

After studying fisheries, the authors discovered this difference was most profound in the Atlantic Ocean. This is probably because more humans live there, so more fishing occurs, resulting in a greater reduction in fish biomass. Indeed, they decided, the Atlantic situation showed how low numbers of economically valuable prey can prompt higher kill rates.

The teams found that humans’ unprecedented predatory behavior can massively impact ecosystems. Human behavior has changed the sizes of various populations, in addition to their life-history traits. They alter other species’ reproductive potential, and food web ecological interactions.

Model fishing folk

Fishers and nations, both, need to establish strict rules and regulations to protect adult fish from behaviors that could lead to the extinction of their species, the teams reported.

Darimont told *Bioscience Technology* this was not as far-fetched as it might sound.

“Some nations and governmental levels within are reducing harvest rates, even trying so- called 'balanced harvests' which include, not only the largest individuals within populations, but also younger and smaller individuals,” he told *Bioscience Technology*. “Truth is, however, there is much work to be done, and against a background of ever-growing demand for wild foods.”

The Heiltsuk Nation serves as a “sort of” good example in this area right now,

Darimont said. “The Heiltsuk Nation— a First Nations group that considers itself a sovereign state—is one example of several First Nations in Canada that wants to improve fishing in waters currently controlled by Canada. There, owing to low herring stocks, they have abandoned the 'kill fishery,’ which kills the females—which otherwise could live to breed again for many years—-just to get at the high value eggs for big Asian markets.”

There is, Darimont explained, “a large corporate kill fishery. The Heiltsuk, instead, practice a traditional roe-on-kelp fishery, taking a portion of the eggs of the herring deposit on near-shore giant kelp. In this way, this 10,000 year fishery is more like typical predation in the wild, targeting what we refer to as the 'reproductive interest,' and safeguarding the 'reproductive capital': the adults.”

Well-conducted study; three disturbing insights

Courchamp told *Bioscience Technology* that Darimont’s “very well conducted study” reveals two key problems. First, humans “exploit too much of the animal species we hunt and fish, too heavily for them to have time to renew their populations and to provide more individuals in the future for us to hunt/fish.”

We know, he said, that all species are “perfectly adapted to the conditions of their natural environment, and that that is true for the dynamics of their populations as well. Predators are relatively scarce as they reproduce less. If they become too numerous, they have fewer prey each, and survive less and/or reproduce less, and their numbers lower the following year. Prey can tolerate high levels of predation because predators only take the population surplus—in general, the young of the year—and the basis of the prey population remains relatively stable.”

However, said Courchamps, in natural conditions, “when predators become too numerous, prey decrease, causing in turn a decrease of the predator numbers, and the prey then increase back easily. But humans take way too many prey without decreasing in numbers ourselves, because we prey on many different species, plus because we are omnivorous, we don't really rely on prey for survival. So we maintain a high pressure constantly, in most regions of the planet and many species simultaneously. So the prey now decline without all this causing us to lower the pressure.”

The second novel finding of the paper is the way it shows how “our exploitation is also qualitatively wrong,” Courchamp told *Bioscience Technology*. “Predators usually kill the young, the old, the sick and the weak. In a word, predators usually kill those which don't reproduce, those on which the population is not relying to perpetuate the species. They let those which *do* reproduce survive. Those individuals will normally replenish the population in no time. We overexploit the reproductive adults, if possible the largest ones.”

It has been demonstrated that, in most species, from fish to mammals, the largest individuals are the most important contributors to population reproduction. “The fox mostly eats the young rabbits who don't know yet how to escape. We always hunt the adult. Even in fisheries, we have nets specially designed so that they release

the small—which have anyway a low survival rate—and keep the large fish. But science has demonstrated that the large fish we are taking out of the populations would have reproduced the most, and given the most robust offspring. This has a double impact on the populations: direct harvest and imperiled reproduction in the future.”

An additional novel finding, concluded Courchamp: even the exploitation levels that are currently described as "reasonable" or "sustainable" by scientists, “and that are of course not respected by intensive fisheries…are still way too high if they are compared to what natural predators would do.”

Alternative interpretations

Trevor Branch, Ph.D., a University of Washington aquatic and fishery sciences biologist, told *Bioscience Technology* that separating individual marine predators out in calculations does offer one way to look at the numbers. However, another way of looking at them would be to ask, “`What is total mortality from fishers (F) versus total mortality from all natural causes, mostly predation (M)?’ Fishery management typically aims at possessing F equals M, or F equals 0.5M. In other words, for most fisheries, having total fishing be equal to or a little less than total natural predation is the aim of fisheries management.”

Branch, uninvolved with the new study, added that another way of thinking about it is to imagine an ecosystem with a single natural predator, wherein “fishing would be equal to natural predation.…But if there were 1,000 predator species, fishing would be 1,000 times the natural predation of each predator, yet the two circumstances would be identical. This calculation is done [in the paper] for terrestrial predators. [Reports the paper:] `The median proportion of mortality (an independent metric) caused by hunters (0.35) was 1.9 times that (0.19) caused by all other predators combined.’ But it is not presented for marine predators.”

Darimont agreed his team “did not make a similar (all predator) comparison in the oceans because we were not confident we accounted for all predators. We did, however, compare fisheries predation to the exploitation rate of the highest exploiting natural predator on the same prey. Median Fisheries rate was 3.1 times median of the max predator. Note that all comparisons were over adult age classes.”

Agreed Branch: “Yes, it's a bit misleading. I would guess that there are a lot more types of predators eating fish in the ocean than land predators remaining on land, and also that total fishing mortality is on the order of total natural mortality from all sources. Granted, some natural mortality is not depredation.”

Branch concluded something else to consider is that only “about 1,000 to 2,000 species of marine fish are recorded as being caught, out of 15,000-20,000 total. So there are a lot of fish species that are too small, deep, rare, or insignificant to be the target of fisheries.”

• Conference agenda announced:

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Links:
[1] https://www.sciencemag.org/content/349/6250/858.short
[2] http://www.biosciencetechnology.com/articles/2015/05/we-gain-20000-species-yearly%E2%80%94-lose-more?
[3] http://rd100awards.com/?