



3D PRINTING TO THE RESCUE

JOINING FORCES TO HELP ANIMALS

How does an alligator get along without his tail? An eagle without her beak? A puppy without his paws? As you've probably guessed—not so great! But advances in 3D printing, scanning, and design are uniting volunteers around the world with animals that need them.

With the right equipment, you could help a furry, feathered, or scaly friend with a customized 3D-printed prosthesis (artificial body part). And you could do it faster and cheaper than ever before. Read on to see how marvelous makers are already assisting animal rescue organizations, veterinarians, and other experts with their important work.

↑ **Beauty Wears a New Beak**

When a poacher's bullet shattered Beauty's upper beak, the majestic bald eagle was left for dead. Then Jane Veltkamp, raptor biologist at Birds of Prey Northwest, swooped in with the goal of 3D printing and attaching a brand-new beak. Her dream team included an engineer, a dentist, and a veterinarian. After printing several preliminary models, the pioneering crew gave Beauty a beak that looked and functioned like her own. You can read about Beauty's story in the book Veltkamp coauthored with Deborah Lee Rose, *Beauty and the Beak*, or schedule a Skype visit from Beauty's aviary. You can even order the STL file to 3D print a beak replica to study.





↑ **Derby Sprints Ahead**

Derby, an energetic Husky mix, was born without front feet. Abandoned in a shelter, he couldn't run and play like other dogs. But Derby captured the heart of Tara Anderson, who was a director at 3D Systems at the time. Working with experts in braces and prosthetics for animals, Anderson scanned Derby's legs and tried a variety of versions, eventually settling on a spoke-and-rocker design that suited him perfectly.

Derby took off like a shot, racing ahead of his owners and embodying the promise 3D printing shows for animals. "Much of the software we used is available online, some at a low cost or even for free," says Evan Kuester of 3D Systems. "Jump in and try it!"



← **Rocky and Lola: Turtles in Trouble**

Rocky, an endangered Green sea turtle, and Lola, a critically endangered Kemp's ridley sea turtle, both arrived at the Key West Aquarium in Florida after sustaining serious injuries. With permission from the Florida Fish and Wildlife Conservation Commission, Lola became the first sea turtle in the world to receive a 3D-printed biomimetic flipper. (Biomimetic means imitating nature.) Based on the design developed by students at Worcester Polytechnic Institute, expert prosthetist Kevin Carroll fabricated a similar flipper for Rocky. Rocky and Lola are doing swimmingly. They feature in the aquarium's sea turtle conservation tour.



↑ **Mr. Stubbs Isn't Stubby Anymore**

Mr. Stubbs, a victim of wildlife traffickers, lost his tail. Fortunately, he was rescued by the Phoenix Herpetological Society (PHS). A traditional prosthesis would involve making molds from another alligator—an intimidating and pricey prospect. So keepers and researchers from Midwestern University elected to scan a similar-sized alligator, print a tail, and cast a prosthesis in a bendy material called Dragon Skin. "All animals deserve to live their best lives," says Katelyn Garcia, PHS's outreach director. Mr. Stubbs would undoubtedly agree!

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