THE POOP
ON SITKA DEER ABUNDANCE

Investigating Deer Populations and Hunters on Prince of Wales Island, Alaska

By Todd Brinkman, Ph.D.

Images courtesy of Todd Brinkman and James Baichtal

"Stop! Look. There's one right in front of us.

Wow, that's a nice one.

Sure is. I already can tell that we'll want to take that one home.

Yup. Let's bag it!"

Those excited words were uttered often by my companions and me in 2006, 2007, and 2008 as we searched the coastal forest habitats of southeast Alaska. What spectacular trophies caused all the excitement? Huge Sitka deer bucks? Enormous bull moose? Nope, it was deer dung, otherwise called fecal pellets. Not just any pellets, mind you, but prime specimens that were smooth, shiny, and slippery to the touch. Bagging such high-quality quarry never failed to excite us intrepid hunters. You don't think that hunting poop is sexy? Admittedly, a 30-minute slot on the Outdoor Channel is unlikely to be offered anytime soon. I don't care. The three-plus years spent locating, sampling, and analyzing feces are a highlight of my life. Let me tell you why…

THE SETTING

My story is set on Prince of Wales (POW) Island, located in the temperate coastal rainforest of Southeast Alaska. POW is the fourth largest island in the United States and contains 11 small communities connected by something rare in Southeast Alaska—a road system. The road network was created to support a timber industry boom that began in the mid 1950s. How large a boom? Consider that the little POW community of Thorne Bay (pop. 584) was once the largest logging camp in North America. Although world-class black bears (*Ursus americanus*) are commonly taken from POW Island, the Sitka blacktail deer (*Odocoileus hemionus sitkensis*) is the most important big-game species here and throughout Southeast Alaska, for both subsistence and sport hunting. The Sitka deer, found only in Alaska and a bit of coastal British Columbia, is a stocky but smaller subspecies of mule deer. Harvest regulations are liberal, with resident hunters allowed up to five deer per year. Non-resident tags are available over the counter for less than half the cost of other Alaskan ungulates. Consequently, more than 70 percent of households on POW Island consume venison, and deer hunting is deeply ingrained in the local culture and tourism industry.

THE PROBLEM

The late 1990s saw considerable anxiety among local deer hunters on POW Island as they reported difficulty in harvesting enough deer to meet their needs. Several explanations were suggested including: increased competition among hunters—specifically, increased pressure from hunters arriving on the new inter-island ferry from the population center of Ketchikan; overhunting; predators (mainly wolves, *Canis lupus*); and, a decline in quality of deer habitat associated with past intensive logging. No clear cause-and-effect relationship was evident, however. Debates intensified during the next few years, creating a rift among stakeholders. Local hunters saw a need to restrict harvest opportunities of other hunters, and people were becoming fighting mad. By the early 2000s, deer hunting on POW Island was the most contentious wildlife management issue in Southeast Alaska. Something had to be done.

Wildlife biologists scrambled for answers but none were found. In 2003 the U.S. Forest Service launched a special deer subcommittee to address the increasingly divisive issue. Embracing a co-management philosophy, the subcommittee included local tribal organizations, hunters, guides, foresters, and wildlife scientists. After a year of meetings, the group concluded that resolution was unattainable without reliable information on the causes of the problem. Specifically, they needed to understand status and trends of the deer population in order to determine whether the problem stemmed from inadequate deer numbers. They also needed to understand how deer and hunters were responding to changes wrought by 50 years of intensive logging. This was both a social and an ecological problem, so both kinds of information were required.

Wildlife biologists in this area had been managing deer for several decades without precise information on deer numbers. It wasn't for lack of trying. In the densely vegetated habitats of the coastal rainforest, it is nearly impossible to estimate abundance of deer through common techniques such as direct observation (e.g., aerial surveys). The forest canopy screens visibility from above, and thick vegetation obstructs visibility on the forest floor. For decades wildlife managers have counted fecal-pellet groups to get crude estimates of deer abundance, but managers could only speculate whether deer numbers were increasing or decreasing. Further, incomplete deer harvest records have hindered the derivation of population trends from hunter success and effort. In summary, there was a serious need for more and better data.

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This is where I enter the story. In 2003 I had just completed a master's degree from South Dakota State University where I studied movement and mortality of whitetail deer (*O. virginianus*) in farmland (mainly corn and soybeans) habitats. Arriving at the department of biology and wildlife at University of Alaska Fairbanks to commence a PhD program, I received a proposition something like this:

How would you like to tackle a slippery research problem that involves angry hunters, fieldwork in America's rainiest place, and a forest-dwelling species that defies normal research methods? You'll begin by learning enough social science to engage these perturbed hunters in figuring out why harvest opportunities may be declining. Then, you will need to determine, with statistical rigor, how many deer are on Prince of Wales Island and how and why that number changes through time. By the way, a handful of agency people in Southeast Alaska don't think the task is possible and consider your future research a waste of time and money. Also, because your background is in biology, many people don't think you should be the one talking with hunters. These skeptics are asking, "Why is a plumber being brought in to do the electric work?" One final thing—we don't really have a plan, but there are a lot of folks counting on you.

(Actually, I exaggerated a bit. There is a place in Hawaii that receives more rain than Southeast Alaska.)

My answer? Sign me up! While I'm not fond of frustration and pain, I thought I could help. The project combined my primary professional interest of big-game research and my personal fondness for "bull" sessions with fellow hunters.

THE PLAN

After a few months of creative thinking with my doctoral committee, we convinced the U.S. Forest Service and the Alaska Department of Fish and Game to fund our study. In phase one I would live and hunt deer on POW Island during 2004 and 2005 to develop an understanding of hunter patterns and relationships between deer, habitat, and hunter opportunities. After reaching a comfort level with the people and the place, I would conduct intensive face-to-face interviews with 75-100 active and experienced deer hunters across the island. I would systematically analyze all possible causes of hunter difficulty and explore linkages between hunter patterns, deer populations, and deer habitat change in the last 50 years.

For the biological component I would attempt to count deer without ever seeing or disturbing them using recently developed genetic methods. This involved systematic collection of deer fecal pellets in several POW watersheds and extraction of DNA to identify individual deer. Similar methods have been used on grizzly bears (*U. arctos*) and other carnivores in the lower 48 (or "outside" as Alaskans say), but the technique had never been used to estimate abundance of wild ungulate populations. Our approach was experimental and relatively expensive compared to traditional counts of fecal pellets. My confidants and I frequently

questioned our chances of success and pondered the consequences of failure.

THE PROCESS

I conducted and digitally recorded 88 interviews with local deer hunters, each about 90 minutes depending on how eager they were to share their experiences. Typically hunters spent the first part of the interview sizing me up. Around the 15-minute mark, they usually discovered that my intentions were good and that hunting was also an important part of my life. After that, all interviews went smoothly. Most occurred in the hunter's home and involved liberal consumption of coffee. After a day of three or four interviews, spiked caffeine levels had me feeling and looking the part of a very bad experience with an electric fence. Insomnious evenings were ideal for categorizing interview responses and pondering what hunters thought was happening with deer and habitats on POW Island.

The typical POW hunter I interviewed had 20 years of deer-hunting experience and had killed six deer each year (including proxy hunting for elders and others unable to go afield). Typical access to hunting areas was by motor vehicle. Hunters preferred to hunt open habitats such as muskeg bogs, young clear-cuts, and alpine tundra—avoiding forests logged more than a decade ago. Hunters reported that deer still occurred in areas logged 10–20 years ago, but the thick regrowth prevented effective spotting and stalking. Hunters also reported few deer in forest logged more than 30 years ago because the thick forest canopy had shaded out the forest floor, leaving the understory barren of deer forage.

With the social science work done, I re-focused on feces. Spring 2006–2008 found my team collecting samples from pellet groups we encountered along strategically established trails. We would mark and re-survey the same trail three to eight times a year (depending on weather) in 10-day intervals. We always removed fecal pellets that were not collected so we would know that every pellet group encountered during the next survey was a fresh deposit since the last visit. A typical day involved walking about four miles through the forest and I enjoyed almost every bit of it. Maybe "walking" isn't the right term. Belly crawling under fallen trees, stumbling through brush, sliding down wet slopes, and becoming a pincushion for thorny plants (appropriately named devil's club) better describe the actual experience. We were beating ourselves up, but in one of the world's most beautiful ecosystems.

During the three-year study we encountered 10,569 pellet groups and collected pellets from 2,248 of these for DNA extraction. Pellet samples were preserved in plastic vials filled with 99 percent ethanol and taken to the Wildlife Conservation Genetics Laboratory at the University of Alaska Fairbanks. There my assistant and I extracted high-quality DNA from 1,156 samples (51 percent success rate) and used genetic markers specific to deer to identify 737 individuals. We actually extracted DNA from the surface of the pellets. As pellets form and pass through the gut of the deer, they pick up shed skin cells and mucus along the way. We determined that washing off this mucus layer with a special chemical and then extracting DNA from the wash solution yielded the best results.

After studying the appearance of around a thousand samples, we could predict with fair accuracy how much DNA a given pellet would yield. Our indicators were smoothness and sheen of the pellet surface, how the pellet group clumped, and how slippery (from the

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mucus) the pellet was in our latex gloves when being placed into a collection vial. A wet and old pellet may still be shiny and smooth, but only a freshly deposited (within a couple days) pellet will be slippery to the touch. Another thing to keep in mind, pellets deposited during late winter tend to be smaller, harder, and darker because deer are on a woody diet. These pellets can persist much longer in the field and, to an untrained eye, appear fresher than they actually are. If you put one of the pellets in your bottom lip, you also can tell if it was male or female.

That last bit was a joke—don't try it.

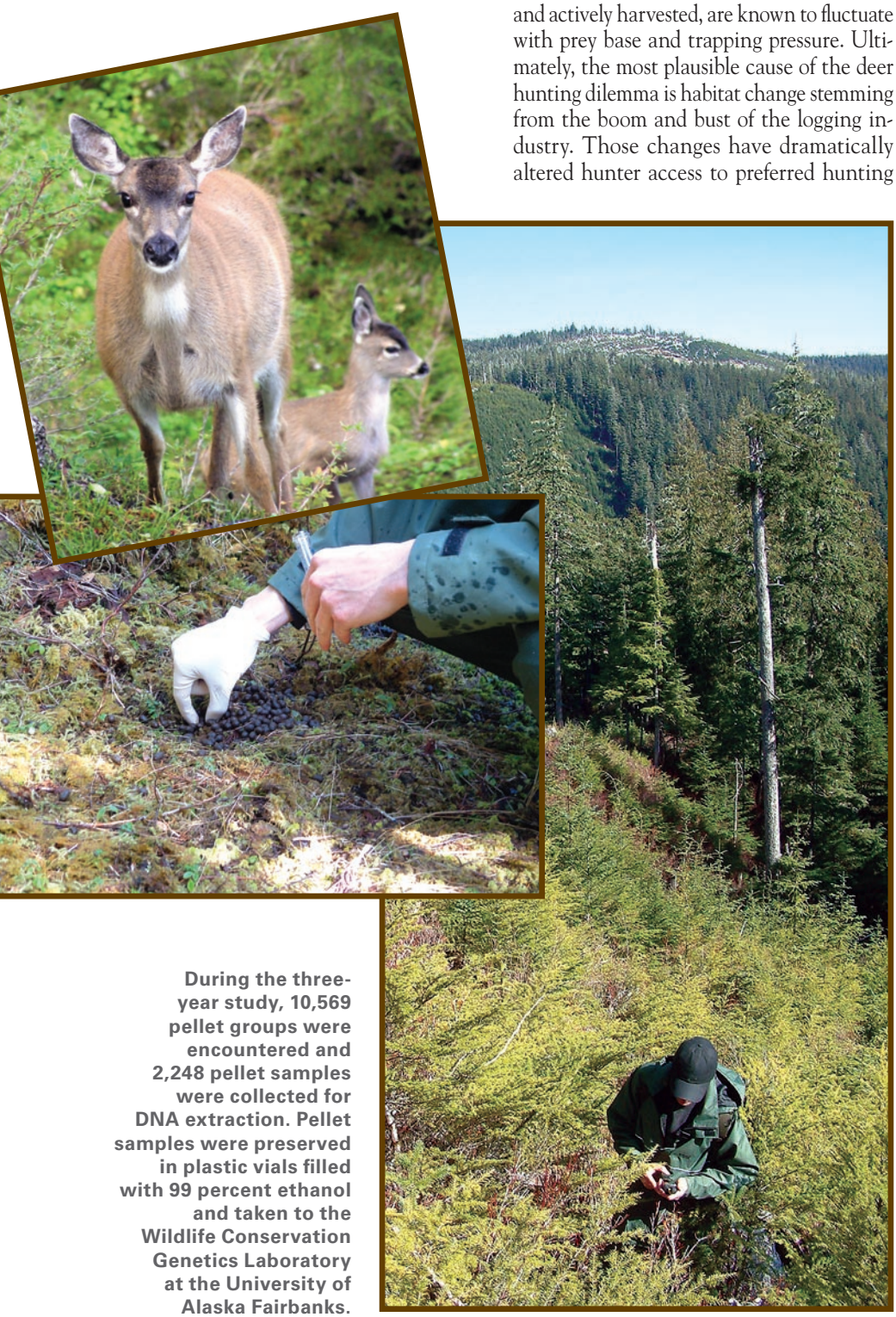
THE OUTCOME

What did we discover about the possible causes of hunter difficulty? Explanations based on recent changes in predation or hunting pressure could be ruled out. Hunter numbers and harvest levels have remained stable over the last 25 years. And predators, which have always been part of the system and actively harvested, are known to fluctuate with prey base and trapping pressure. Ultimately, the most plausible cause of the deer hunting dilemma is habitat change stemming from the boom and bust of the logging industry. Those changes have dramatically altered hunter access to preferred hunting habitats, with negative consequences for hunter success.

I can best explain how landscape change has indirectly affected hunter opportunities by taking you through a timeline of events derived from hunter interviews and landscape analysis. An extensive road system was constructed on POW Island in the late 1950s to early 1960s to support the explosion in commercial logging activity. Deer hunters changed their traditional practice of hunting the shoreline from boats to a new strategy based on roads that opened access to habitats in the island's interior. More areas were available to hunt, and each year brought dozens of new clear-cuts conveniently located along roads. After an area is logged, an explosion of forage plants attracts deer into the clear-cut habitats. Hunters had easy access to large open areas with excellent visibility and high densities of deer. The fact that these clear-cuts became poor habitat for deer hunting about 10 years later didn't really matter. New clear-cuts were being created as fast as old ones were becoming unsuitable for hunting. This trend lasted for about 40 years. It was a great time to be a deer hunter!

In the late 1990s and early 2000s, markets for Southeast Alaska timber collapsed and logging activity slowed to a crawl. Some new clear-cuts were created each year, but exponentially more land converted to non-huntable second-growth forest. Further, a lack of timber sales on public land led to insufficient funds to maintain the existing road network for passenger vehicles, and secondary roads were being decommissioned. In 2000 the scenario was one of reduced hunter access and diminished hunting habitat. This, in turn, increased the chances for contact among deer hunters in the field, and competition for the remaining clear-cuts increased. Hunters perceived an increase in hunting pressure even though hunter numbers remained steady. The deer hunting strategy that had served two generations of hunters was suddenly inefficient for filling freezers and trophy walls.

So, how have deer populations fared during the boom and bust in logging activity? We used data from the 737 unique deer that we identified from fecal DNA to compare deer densities in logged and unlogged forest. We determined that deer densities in forest logged more than 30 years ago (7 deer/km2) were just over half that of deer densities in unlogged forest (12 deer/km2). Since most logged forest will transition to this age class within the next decade, and much of the existing road network is surrounded by logged forest, there is a mismatch that works against hunter success. The easily accessible areas now support the lowest deer densities and



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BEST OF 2010

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The hunting experience is remembered and reflected back upon in many ways. In the old days, just the meat, head skins, hides, horns, antlers or tusks were salvaged as mementoes of successful hunts. With the advent of the camera, photographs were added to what we could carry with us across time to remember the hunt and honor the animals taken. Today, we can add video to this list. Even with living pictures available, still photographs taken with great pride and care remain a very important part of our hunting culture.

The Boone and Crockett Club has a tradition of honoring trophies and the fair chase hunts that produce them, including photographs from the field. Examples of outstanding trophies entered and accepted into the Records program have been shown in our Trophy Photo Gallery ever since the Club began publishing it's *Associates Newsletter* in 1986, now titled *Fair Chase* (1994). In keeping with this tradition, the Club, and our friends at Swarovski, thought it would be a good idea to take this one step further and celebrate some of the best examples of field photography, and share them with you in each issue of *Fair Chase*.

This year, starting with the spring edition, your editors will be sifting through hundreds of entry photos looking for exemplary examples of trophy field photography. At the end of the year, we will be selecting the most outstanding examples and awarding prizes provided by Swarovski Optic to the top three photos. All field photographs from accepted trophies in 2010 are eligible. Editors' picks will be featured in the Spring, Summer, and Fall issues, with the top picks and award winners published in the Winter 2010 issue.

Canaan W. Haywood
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Wabash County, Indiana
November 2009

Lorenzo Sartini
Non-Typical Mule Deer – 238-1/8
Garfield County, Utah
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Bruce J. Perry
Bighorn Sheep – 186-1/8
Lewis and Clark County, Montana
November 2009

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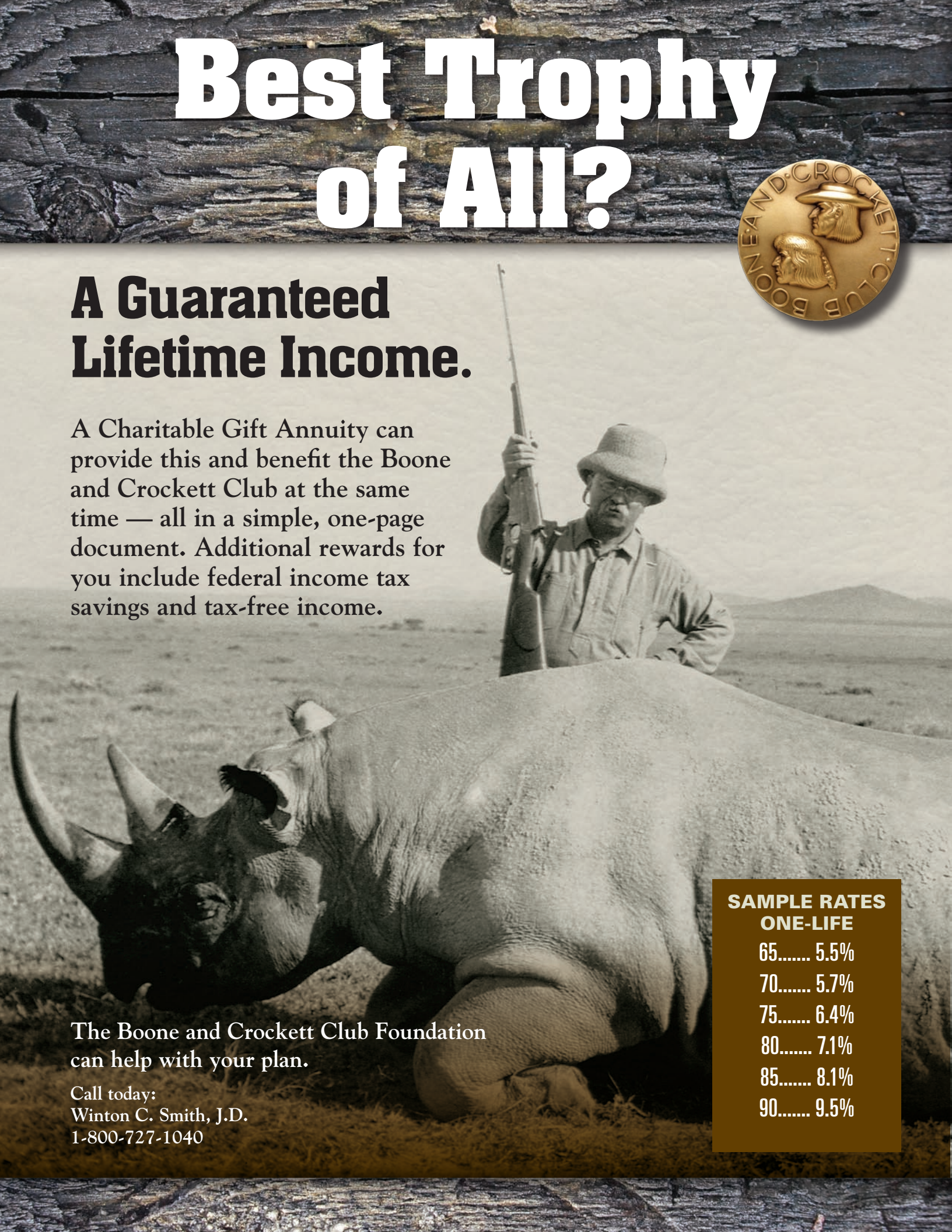

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the habitats that are least preferred by deer hunters.

We also learned more about how winter weather can influence population trends of Sitka blacktail deer. Because Sitka deer occupy the northern range limits for *Odocoileus*, severity of winter weather is thought to drive their population trends. Dozens of scientific papers support this hypothesis; however, quantitative estimates on population change have been absent. Our study on POW Island coincided with consecutive severe winters with snowfall 37 percent above the long-term average. Our annual estimates of population size mirrored the snowfall pattern, declining by 30 percent. This makes biological sense because the last time Southeast Alaska received three consecutive years of above average snowfall was in the early 1970s. Therefore, populations may have been hovering at or above habitat carrying capacity since then, resulting in a herd size vulnerable to the next harsh winter.

If winter weather has the potential to drive population size on an annual basis, then we can evaluate historic records of winter severity to better understand how the deer population may have fluctuated in the past. When hunters began expressing concern in the mid to late 1990s, winters were mild with no years of above average snowfall. Deer numbers probably have declined in some second-growth habitats; however, it's unlikely that an island-wide crash was the root cause of the deer hunter dilemma. For instance, consider that in 2006, unlogged land in one of our study sites supported the impressive level of 30 deer/km2.

THE IMPLICATIONS

My interdisciplinary approach afforded a unique opportunity to investigate how deer and hunters have responded to decades of landscape change. Although we found that the trajectory of change might not be positive, the improved understanding of potential causes and consequences will place hunters and wildlife biologists in a better position to strategize how to adapt. When emotional debate gives way to informed discourse, the prospects for problem-solving are greatly increased.

Hunters now can better understand that their difficulties indirectly relate to the dynamics of global timber markets, which are not under local control. Interest groups in Southeast Alaska have started banding together rather than passing the blame. New partnerships including the U.S. Forest Service, The Nature Conservancy, universities, tribal organizations, environmental groups, and local lumber mills have formed to help the area transition to a restoration economy focusing on needs and opportunities in second-growth forests left from the era of logging. Their objectives are to increase hunting opportunity, sustain the local timber industry, and improve ecosystem health. Findings from my study will be an integral part of the process. The deer issue has gone from a rolling boil to a quiet simmer.

Our study was the first to estimate population size of an unenclosed population of ungulates using DNA from feces. Further, this study resulted in the first precise estimates of population size for Sitka blacktail deer. Admittedly, I feel we got lucky. We weren't sure we could get good DNA from naturally-deposited fecal pellets. And we weren't sure we could find enough of it to say anything at the scale of a deer population. Fortunately, I had support and guidance from a brilliant doctoral committee and dozens of engaged deer hunters. I'm also grateful for strong agency biologists who provided political shelter so I could concentrate on the research.

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EDITOR'S NOTE: Todd Brinkman is now a Post-doctoral Fellow at the Institute of Arctic Biology at the University of Alaska, Fairbanks. His current research focuses on merging hunter knowledge with climate models to better understand the status and trends in availability of subsistence resources (e.g., whale, caribou, moose) in the Arctic and Boreal forest of Alaska.