

**Harvesting longevity**—Richard Carstensen

Whether studying clams, fish, deer or trees, northern researchers and naturalists frequently learn that life-span data from southern climes are inapplicable here. Underestimating longevity has serious consequences, especially for wild flora and fauna treated as commercial, sport, or subsistence species.

**Mollusks** Until recently, most clams have not been recognized as particularly long-lived species; concentric rings formed on the valves were simply counted out to the edge of the shell. However, it's now known that annuli become more tightly spaced at the edge of the shell on older animals, rendering accurate counts from external indicators impossible. Today it's common to section part of the hinge and examine the annual growth lines microscopically. Using these internal growth lines, a 103-year chronology has been developed for long-lived geoducks.

Kristen Munk, a biologist and growth-pattern specialist, applied these techniques to clams from beaches around Juneau. Results were sobering. Hinge-section ages for butter clam greatly exceeded the externally evident shell ages, with specimens over seventy years old reported. Harvested littleneck clams often exceed ten years and sometimes twenty years old; the oldest littlenecks are often small and round, earning them the name 'walnuts.' Imagine, then how many centuries of growth are represented by a bucket of littlenecks; one well-fed deer produces more venison in a single year! Clam diggers have extinguished edible mollusks from favorite beaches, and recolonization potential remains unknown.

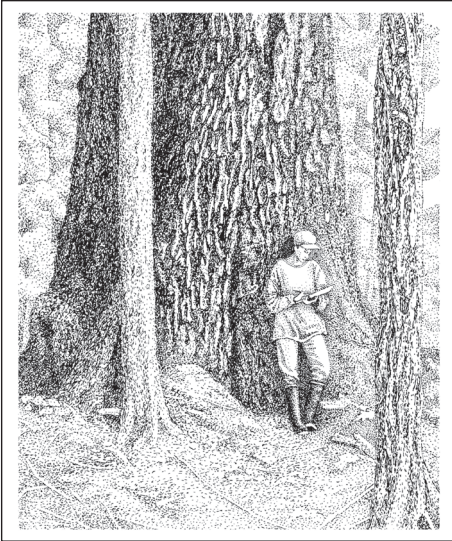
**Groundfish** While salmon are famous for rapid growth and early mortality, most Pacific groundfish—bottom-oriented marine species—generally demonstrate the opposite reproductive strategy. As on land, many of our high-latitude sea creatures grow more slowly and live longer than their counterparts from lower latitudes.

Most fish are aged by examining their sagittal otoliths, a pair of small bones in the inner ear. Charred in flame, or rendered translucent with clearing solution, annuli are counted, as with trees or sectioned animal teeth. Also as in trees, slower growth in later life creates tighter, less-distinct rings. Otolith age-reading is an art as much as a science.

Published studies indicate that Pacific groundfish species of deep, cold water tend to live longer than shallow warm-water species. Quillback rockfish are an

**Right:** *The maximum recorded ages of groundfishes in the eastern North Pacific and Bering Sea. Our state's oldest and second-oldest documented fish—a 205-year roughey and a 157-year shortraker rockfish—both came from Southeast Alaska. Data from Munk (2001).*

groundfish species	age
sablefish	94
Pacific cod	25
walleye pollock	28
lingcod	33
Pacific halibut	55
yellowfin sole	34
roughey rockfish	205
shortraker rockfish	157
quillback rockfish	90
black rockfish	55
China rockfish	78
yelloweye rockfish	121



*Recording ten-foot diameter Sitka spruce on Tāan, sea lion (Prince of Wales Island). We expect giants to be old, but what other ancient organisms are we overlooking and endangering?*

important commercial species, sold at fish markets. With a reported longevity of ninety years, quillback can be older than the people eating them! Unfortunately, fish market workers can rarely identify the rockfish species at their counters for the conscientious consumer.

**Trees** As with clams, the largest tree in a given acre is rarely the oldest. In 2005, while assessing sustainability of Tongass

timber practices in the Ground-truthing Project, my loyalties began to shift from great size to great age. Unfortunately, it's generally not possible to determine the age of a tree based upon diameter and height. Sections of its growth rings are required. Also, most hemlocks and cedars more than a few centuries old have heart rot. (Sidebar; *Twenty years of learning*, p. 50.)

In their book *The Olympic Rain Forest*, Ruth Kirk and Jerry Franklin describe conifers that reach maximum size for their species on Washington's fertile coast:

"Despite huge size . . . Olympic Peninsula lowland trees are not particularly long-lived. Instead, they follow a live-fast, die-young pace. . . Ages here typically range up to about 400 years for Sitka spruce and western hemlock . . . Spruce almost twice this age flourish in southeast Alaska, where soils are less optimum . . . Alaskan spruce . . . grow relatively slowly, which seems to foster longevity."



Even red alders, considered 'weedy,' short-lived trees in the lower 48—rotten and leaning at eighty years—can live (like spruces) twice that long in Southeast Alaska. The phrase "old-growth alder" would be an oxymoron in Oregon, but I've seen many individuals and even a few stands

*Coring a twenty-three-inch-diameter red alder on Chichagof Island. A pencil-thick sample is removed and annual rings counted. This still-vigorous tree was at least 150 years old.*

Mandibles from Sitka black-tailed deer. Young animals have high, sharp cheek teeth. After four years, age estimation from tooth-wear becomes less precise.

deserving of that distinction on the Tongass.

Although red alders in Alaska grow more slowly than those in Oregon, they reach commercial size about ten times faster than do Alaskan yellow-cedar, as well as providing better fish and wildlife habitat throughout successional development. Alders are therefore better suited than red- or yellow-cedars to sustainable forestry. So far, however, few mill owners are interested in easily regenerated species. Disincentives include low board-foot value for alder, contrasting with very high prices and raw-log export loopholes for cedar; these are termed “perverse subsidies” by the Resilience Alliance ([www.resalliance.org/index.php/resilience](http://www.resalliance.org/index.php/resilience)).

**Deer** Black-tailed (and white-tailed) deer are considered to be fast-growing, rapid-turnover game species—the “alders” of North American wildlife. Where heavily hunted, five years is exceptionally old. Age estimates from molar wear and configuration are reliable for young animals, but speculative in older deer. For better accuracy an incisor is sectioned and stained for counting of annular growth rings. In one study of 113 female Colorado mule deer, the 4 oldest (3.5 percent of sample) ranged from ten to thirteen years. How does that compare with Alaskan blacktails?

In 1985, 54 Sitka black-tailed does were collected on Chichagof Island for assessment of reproductive potential. Tooth-sections revealed that 4 (7.5 percent of sample) were at least fifteen years old. Although this study has not been replicated, it hints that Sitka blacktail maximum age could be much greater than commonly assumed for North American deer.

“**Harvest**”—a term borrowed from agriculture—is of dubious merit when applied to seas or forests where cycles of birth-to-death are less visible, less understood, and less amenable to control. The consequence of overharvest is quickly obvious to a farmer, who sinks or swims financially on personally owned land. But when “harvesting” wild “resources” from public lands and waters, it’s harder to assign blame, or to instill restraint. For some managers and harvesters, exhaustion of one species is simply a cue to move on to another one, perhaps equally ill-suited to commercial or even casual extraction. This frontier mentality is a bull in the china shop of long-lived species.

