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State of the Northwest

CASCADIA SCORECARD

SEVEN KEY TRENDS SHAPING THE NORTHWEST

NORTHWEST ENVIRONMENT WATCH
SEATTLE

NORTHWEST ENVIRONMENT WATCH is a not-for-profit research and communication center in Seattle, Washington. Its mission is to promote a sustainable economy and way of life throughout the Pacific Northwest—the biological region stretching from southeast Alaska to northern California and from the Pacific Ocean to the crest of the Rockies.

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THIS PLACE: CASCADIA

The Pacific Northwest includes British Columbia, Idaho, Washington, Oregon, and adjoining parts of Alaska, Montana, and California. Often called Cascadia—for the Cascade Mountains and the earthquake-prone Cascadia subduction zone—the region is home to more than 15 million people, along with diminished but still impressive numbers of salmon, eagles, grizzly bears, killer whales, and wolves. It boasts an economy that generates more than $450 billion worth of goods and services each year.[1]

Long united by similar indigenous cultures, Cascadia was once briefly a single political unit—the Oregon Territory—shared by several nations. The region has since been divided into different political jurisdictions, but this place has a dawning sense of itself: a place bound by salmon and rivers, snowcapped mountains and towering forests, and a people who share geography, history, and aspirations.

Cascadia has traditions of innovation in the public and private sectors, a well-educated populace, and a reputation for a commitment to the environment and quality of life that continues to draw migrants even when unemployment rises. This is no accident: the Northwest retains a larger share of its ecosystems intact than perhaps any other part of the industrial world and has helped set the conservation agenda for the continent—with the first bottle bills and urban growth management laws in the 1970s, trend-setting energy conservation and curbside recycling efforts in the 1980s, old-growth forest protection in the 1990s, and the first endangered species listings to affect major cities.[2]

But there is a broader challenge to which the Northwest is just beginning to rise: gradually but fundamentally realigning the human enterprise so that the region's economies and their supporting ecosystems

both can thrive. Daunting, complex, systemic, seemingly quixotic, this goal—harmonizing people and place—is nonetheless more attainable here than anywhere else on this continent. If northwesterners can reconcile themselves with their landscapes, they can set an example for the world.

SLOW NEWS

The oldest stories of this place often start with Raven, a mythical bird and favored culture hero of Northwest coast peoples. This story does too, if only as a connection to the past and a way to gain perspective. In a tale from the north, a great flood covers the land, and Raven, the trickster, somehow ends up hanging by his beak from the sky, his wings supporting the last surviving humans. As often happens when he approaches the edges of the world, time shifts gears, and he watches as the years rush past, his curious eye tracking the water level. With his time-lapse view, he is not distracted by dramatic but short-lived events below; instead, he sees the fundamental pattern that emerges—a world gradually returning to normal, where humans can again thrive.[1]

In recent generations, a figurative flood—this time of people, the descendants of those survivors—has swept the Northwest. And if Raven is again high above, scouting the deluge, the alterations he observes are likely things we humans rarely notice. He sees, as if in fast-forward, the slow changes of the forests, rivers, and coasts; the steady accumulation of our handiwork across the land; and the gradual transformation of our communities and ourselves.

Over the course of a century, Raven has watched northwesterners add three decades to their lives, multiply their number ninefold, and increase the value of their economic output thirtyfold. Their cities and farms have spread across the most fertile lowlands in the region. Their clearcuts, dams, ranches, and roads have transformed much of the rest. And many species have seen their populations plummet (although his kin the ravens and his cousins the crows have not).

These shifts are extreme over decades but almost imperceptible day to day. For that reason, they stand out to Raven but fade for us.

Slow news shapes the future more than fleeting, headline-grabbing events

We humans adapt so quickly to new circumstances that we find it difficult to focus on change that only inches along. Dramatic events, not incremental ones, attract our curiosity, and our media reflect this trait. A news story, for example, usually lives for one day—until the next newspaper is printed, the next broadcast prepared. The news that Raven sees, call it "slow news," runs on a longer timeline. Cut into one-day installments, it varies only slightly—like one frame of a movie compared to the next. Yet in most ways, slow news shapes the future more than fleeting, headline-grabbing events: the routine permitting and building of new houses that happens citywide on a day, for example, usually has more lasting effects than a house fire that draws TV cameras.[2]

Even the few measurements of slow news that are reported in the media—the Dow Jones industrial average, the consumer confidence index, gross domestic product—are misleading. The Dow, perhaps the best-known economic indicator in the world, is a running joke among stock market insiders: it averages the stock prices of 30 companies without adjusting for how many shares are in circulation. That's like counting your money by tallying the number of bills without regard to their denominations. Similarly, the consumer confidence index, a widely reported indicator of the economic outlook, is almost useless: the monthly changes in consumer confidence are, as often as not, statistically meaningless—they are inside the margin of error. Worse, consumer confidence is only loosely correlated with the consumer spending it purports to predict.[3]

And gross domestic product, regarded by many as the bellwether of progress, not only is rife with arguable statistical procedures, but also does not measure what people assume it does. It tracks economic activity, not economic well-being. GDP can and often does rise even as economic security diminishes, as it did during the "jobless recovery" of 2003. Likewise, uncontrolled logging and mining boosts GDP, at least temporarily; and the loss of trust and honesty in communities can expand GDP by, for example, increasing sales of security systems. Relying on indicators

such as these, and lacking Raven's time-lapse vantage, northwesterners are not just uninformed; they are deceived.[4]

As an alternative and perhaps an antidote to such indicators, Northwest Environment Watch has devised the Cascadia Scorecard, an index of seven trends shaping the future of the Northwest. A simple but surprisingly far-reaching gauge of progress, the Scorecard tells the slow news. In its regular updates, the Scorecard's seven indicators—health, economy, population, energy, sprawl, forests, and pollution—will provide status reports for the region and, by highlighting successful communities, offer a practical vision for a better Northwest.

The Scorecard helps put a spotlight on the long view and the questions that most matter over time: Are we living longer, healthier lives? Are we building strong human communities? Are we handing down to our children a place whose ecosystems are regenerating?

The components of the Scorecard are few so that its view remains uncluttered, so that it tells the most important stories. Yet its simplicity hides robustness: each Scorecard indicator actually reflects an array of major concerns for the future. Each sits at a critical junction in the web of causes and effects from which the region's future emerges; the Scorecard overall omits few crucial determinants of the Northwest's prospects. Some—such as health, economy, and forests—measure progress toward northwesterners' ultimate ends, such as good health, shared prosperity, and ecological integrity. Others—such as energy and sprawl—track underlying trends that systematically move the region toward or away from those ends. Still others—such as population and pollution—serve as proxies for both ends and means.

Like the figures on totem poles, the seven key trends in the Cascadia Scorecard are most meaningful when viewed together. All rest upon each other, interlocking and interlaced, completing the pattern while complementing their fellows. Just as the carved totem creatures often have subsidiary faces gazing out from their eyes, wings, and tails—the

faces of their many identities and relations—so too, do the indicators have multiple facets.

1. HEALTH

A century ago, Cascadia's mothers ran a 1 in 100 chance of dying each time they went into labor; they buried one baby in ten before those newborns could take their first steps. Men didn't fare much better: the US military rejected one-third of its World War I recruits for chronic health conditions. For both sexes, life was short, averaging 47 years.[5]

Today, infant and maternal mortality rates have fallen by more than 90 percent in the Northwest, and the leading killers of yesteryear, such as tuberculosis and rheumatic heart disease, are largely banished. Smallpox, polio, and other afflictions are simply gone. On average, lives stretch for an astonishing three extra decades—possibly a larger increase than that achieved during all preceding human existence—and those lives are less hampered by illness. Northwesterners haven't conquered death, but to a surprising extent, they are holding it at bay.[6]

Whether they continue to do so and whether their health measures up to that of other places are key determinants of the region's future. After all, history is full of examples of a people's health deteriorating over time: from 1800 to 1850, for example, American lifespans dropped by a full decade, despite a fast-growing economy. For mortal beings (unlike for immortal Raven), time is the most precious resource, and a nonrenewable one at that. So health—how much time we have, our lifespan—is perhaps the most fundamental indicator of human well-being.[7]

2. ECONOMY

Aside from the health revolution, the past century's most dramatic change has been the technology-powered explosion in affluence. Consider purchasing power: in 1919, it took 157 minutes at average factory wages for an American to earn enough to buy a fryer chicken; by 1997, it took 14

minutes. Such reductions proliferated, and as a consequence, the share of household income spent on food, clothing, and shelter dropped from 76 percent to 38 percent, even while the quality of these necessities grew. Discretionary spending took up the slack, and consumer goods multiplied, sometimes to ironic lengths: in the Northwest, radios now outnumber ears; shopping malls outnumber high schools; and motor vehicles outnumber drivers.[8]

Of course, all have not shared equally in this cornucopia (see Figure 1). Since 1990, the top-earning fifth of households in the Northwest states have added enough to their income to buy a new SUV every year; others have seen little gain. Conventional statistics like the GDP and average personal income often obscure the economic security status of ordinary northwesterners, which is the key trend measured by the Cascadia Scorecard. Are the region's middle and working classes holding good jobs with reliable incomes? Are low-income families gaining or slipping?[9]

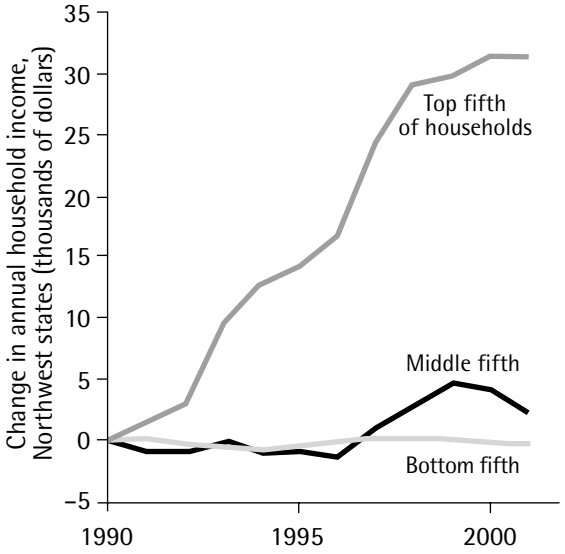


Figure 1. Income gaps in the Northwest states have widened.

Long-term poverty, economic insecurity's worst form, has enduring social consequences. Its victims make do without good medical care or, sometimes, enough food, and the resulting disease and hunger can stunt children's physical and psychological development. Poverty undermines school performance, slows learning, worsens childhood behavior problems, and—where clusters of low-income children are together—retards education for all children. It boosts delinquency and crime, and it escalates domestic violence. Poverty also perpetuates teen pregnancy: some 83 percent of American teen mothers come from low-income families. Combined, these effects manifest themselves across Cascadia as higher costs for public services, reduced productivity, and diminished security for all.[10]

3. POPULATION

Around the world, as women's education, economic opportunities, and autonomy improve, birthrates decline, family size shrinks, and women postpone childbearing until later in life. Teen birthrates and the frequency of unplanned pregnancies diminish especially quickly. Hence, population trends are an excellent gauge of women's—and families'—well-being; they are also among the determinants of future environmental conditions. For these reasons, population is one of the seven trends in the Cascadia Scorecard.[11]

A century ago, the women of the Pacific Northwest had little control over their own lives. They were too often subject to the decisions of their fathers and husbands; had few choices in life; and, lacking effective contraceptives, started their families—large ones, typically—at a young age. Women and some men, of course, tried to control their fertility: before the tall ships came to this place, for example, Coast Salish women swallowed the juice of green cedar cones in an attempt to prevent pregnancy. Women only won the legal right to plan their families in 1972. Profound social changes have reordered relations between the sexes, and these changes seem far from finished: some 38 percent of births in the Northwest states, for example, continue to stem from unplanned, accidental pregnancies.[12]

And population powerfully shapes the Northwest's environment, driving most of the increase in ecological harm. Birthrates account for the share of this growth that has global as well as local implications.

Globally, human numbers, now at 6.3 billion, are rising more slowly than in years past. But they are still rising—by 74 million a year. More than 95 percent of this growth is in developing countries, but every northwesterner consumes and pollutes much more than a Third World resident. The 15 million residents of the Northwest, for example, consume more energy than the 220 million people in Indonesia. Adjusted for these resource-intensive lifestyles, the Northwest's growth counts for more in the global equation.[13]

4. ENERGY

Energy use is a key trend not because northwesterners' hopes for the future are about energy but because their hopes are tethered to it. Of all the commodities produced and consumed in the region, none casts a longer shadow; energy affects everything from national security to economic development, and from salmon survival to climate stability.

Energy affects everything from national security to economic development, and from salmon survival to climate stability

Harnessing modern energy sources—fossil fuels, electricity, and the like—brings countless wonders to northwesterners' lives, wonders unimaginable in the muscle-powered days of the dugout canoe. But energy, as currently produced and consumed, is not free from side effects, and the side effects add up. The Northwest produces very little petroleum or natural gas, so dependence on fossil fuels siphons tens of millions of dollars a week out of the regional economy. The region's demand for oil and gas hinges its economic fortunes to exhaustible well fields and unstable commodity markets: sudden price spikes can trigger recession or inflation. And the region's electric power lines and pipelines are vulnerable in other ways: whether by mishap or mischief, they can fail disastrously.[14]

Energy has environmental costs, too. Dams stress and diminish salmon runs. Burning fossil fuels is the principal cause of air pollution and climate change, and extracting them is a threat to the globe's remaining wild places. And energy use is an indicator of northwesterners' overall consumption of natural resources, because it rises and falls in tandem with most other consumption trends. The Northwest's residents, like others in North America, consume their body weight each day in raw materials, and the resulting waste, pollution, resource depletion, and habitat disruption are the principal environmental shortcomings of the Cascadian economy. Achieving vastly greater efficiency of resource use is the region's primary test of sustainability. Energy use is how to score it.[15]

5. SPRAWL

Sprawl—dispersed, compartmentalized, automobile-oriented urban development—figures in the Scorecard because it contributes to a distressing array of ills. Most northwesterners want to live and work in vital communities surrounded by natural beauty. Spreading out into isolated buildings surrounded by open space, perhaps surprisingly, undermines these goals. Instead, they are best pursued through smart growth: well-designed, compact neighborhoods, where green space is integrated into a mixture of land uses—modern analogs to the tightly clustered longhouse villages where Raven carvings and lore evolved.

New evidence reveals that sprawl is even harmful to social connectedness

The root of the problem is transportation: once scattered, people need far more of it, and they must do most of it by themselves. That makes private vehicles, ideally an accessory to life, into life's organizing principle. Sprawl entails expensive road infrastructure, all but guarantees the congestion of those roads, and then makes transit a more expensive—but less effective—alternative to that congestion. Sprawl locks northwesterners into an auto-dependent lifestyle, with the attendant burden on their pocketbooks, the world's oil fields, and the planet's atmosphere. It endangers health by putting people in harm's way (behind the wheel) nine hours a week and by tainting the air and water with toxic pollutants. It turns walking into recreation rather than transportation, which measurably expands waistlines.[16]

Sprawl also consumes farmland and open space with its massive roads and parking lots. More insidiously, it ruins lowland ecosystems by paving and developing just enough of some watersheds to render them uninhabitable for many aquatic species. At densities as low as one house per acre, 10 to 15 percent of the landscape is covered by impervious surface; coho salmon are rarely found in watersheds where pavement exceeds this level.

Finally, sprawl diminishes community spirit by cordoning off social groups and economic classes. New evidence even reveals that sprawl is harmful to social connectedness. It gobbles up in long commutes some of

the few discretionary hours people have to devote to voluntary work in their neighborhoods, and that participation is the glue of democracy.[17]

6. FORESTS

Monitoring the health of the Northwest's ecosystems may be the Scorecard's greatest challenge, given the paucity of comprehensive, timely data on the condition of natural systems, their innate complexity, and the many stresses they endure. No indicator exists that can reflect ecosystem health in the way that lifespans reveal human health. As a limited but informative surrogate, the Scorecard tracks forest cover.

From coastal spruce and cedar, to mountain-blanketing firs and hemlocks, to pines of the dry interior, the region's forests cloak half of Cascadia. They are its defining ecosystem and nurseries for the region's signature creature, the salmon. They serve as water towers for the region by storing and slowly releasing water for agriculture, cities, and wildlife. They filter the region's air and water, protect soil from erosion, and lessen the severity of floods. They also absorb climate-changing carbon dioxide; the decay and burning from logging generates a tenth of the Northwest's greenhouse gas emissions. Coastal woodlands shelter some of the most vulnerable wildlife, including marbled murrelets and spotted owls, while interior forests are home to remnant populations of lynx, woodland caribou, and grizzlies.[18]

The Northwest, with its well-watered soils, is a good place to grow trees, and the world's demand for wood and paper products is bound to remain strong. Well-managed timberlands can produce a steady supply of lumber and paper, and the forest industry has begun inching toward environmentally sound production. But wholesale clearing of land for timber remains a principal threat to the region's forest ecosystems, particularly its old, never-logged woods. By mapping and measuring places where the entire forest has been cut down, the Cascadia Scorecard provides a rough indication of how effectively northwesterners are safeguarding their natural heritage.

7. POLLUTION

The human enterprise, in its phenomenal run of growth, has also leaked disturbing quantities of noxious compounds into the air, water, and soil—more than four pounds per person per week in the region. People have rewritten the chemistry of Cascadia's ecosystems, changing the concentrations of substances such as nitrogen and lacing the food chain with thousands of new ones. The risks for people and nature are grave.[19]

Some pollution problems have lessened. The air inside Indian lodges and pioneer cabins was laden with smoke. Experts likened breathing Portland's air in the 1960s to smoking a pack of cigarettes a day, and the biggest toxic waste sites in the Northwest surround industrial-age mines. Though diminished, these old problems continue and new ones emerge: the surface of the ocean is a patina of toxics; migrating salmon carry PCBs to pristine Alaskan lakes; groundwater holds an echo of the pesticides sprayed above it; fine particles of soot embed themselves in human lungs; the atmosphere is slowly filling with heat-trapping gases; and northwesterners typically have about 250 synthetic substances metabolized in their bodies.[20]

Among these myriad forms of pollution, the kinds that accumulate in human bodies seem particularly apt choices as indicators. More even than the air, water, or soil, human bodies are the environment that matters to northwesterners, and the environment they are most likely to protect. In particular, the Cascadia Scorecard tracks impurities in mothers' milk. Pollution in breast milk is a good indicator for contaminants in the bodies of both men and women; it's also the pollution that most poignantly shapes the future. In the words of Mohawk midwife Katsi Cook, "Women are the first environment." If the world is contaminated, so too are mothers' bodies and the children they nurse.[21]

The Cascadia Scorecard is not perfect, but it is better than prevailing indicators such as GDP. And it will improve over time as better data become available, drawing slowly closer to the ideal embodied by Raven's

all-seeing, long-term view. Each indicator has room for refinement. Occasionally, an addition or substitution may be warranted. For example, a survey of northwesterners' feelings about their quality of life might be revealing. Environmental quality would be evident in the underlying condition of salmon runs, the true status of endangered species, the condition of bodies of water, or the fragmentation of habitat through road building, if data were available to monitor them.

Keeping Score

In design, the Cascadia Scorecard is simple. It is seven indicators—seven statistical trends. Its creation, however, was complex. Northwest Environment Watch (NEW) selected the indicators from a list of nearly 1,000 candidates during three years of research. In addition to primary and secondary research, the selection process involved formal consultations with more than 40 leading experts, extensive peer review of individual indicators and of the index overall, in-depth interviews with a dozen opinion leaders, three formal focus-group discussions, and scores of informal discussions with diverse audiences. NEW chose the components of the scorecard because they passed seven tests:

1. They reflect progress toward the Northwest's shared aspirations of healthy, prosperous people and thriving, unpolluted ecosystems.
2. They complement one another to provide a good range of coverage of different aspects of human well-being and of environmental conditions and stresses.
3. They are scientifically valid proxies for the larger trends they aim to reflect.
4. They are easy to understand.
5. They can be measured in most of Cascadia.
6. They are relevant in most of the region.
7. They give meaningful readings at least every two years.

Just so, the Scorecard might draw closer to the ideal if it included a way to track northwesterners' education. Unfortunately, educational trends are surprisingly difficult to assess. High school graduation rates are probably the best indicator, but official statistics are not trustworthy. They do not reliably reflect either the share of students who graduate or the direction of change in that figure, because they miss a large share of dropouts. Recent advances in research may remedy these problems.[22]

Crime might serve as an indicator of community well-being if the region's data were reliable and comparable. An even better indicator of the strength of the Northwest's communities might be social connectedness, which specialists call "social capital" and measure through such things as participation in group activities and voluntary organizations. Social capital causes or is closely correlated with a surprisingly long list of social benefits: civil and racial tolerance, prosperity, income equality, successful schools, human happiness, mental and physical health, low crime rates, participation in democratic institutions, low suicide rates, functional families, safe and well-raised children, and more-effective governance. Large surveys using recently developed questionnaires can track social capital. The state-sponsored Washington and Oregon Population Surveys would be perfect vehicles for doing so. [23]

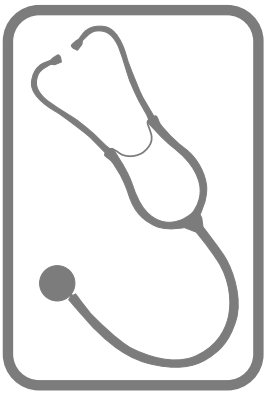
The potential for improvements to the Scorecard does not diminish its present value. Its seven interlocking components reveal many of the key trends shaping Cascadia's future. Its ultimate aspiration, however, is to do more than inform.

Raven is not just a detached observer. He is a creator as well, a transformer of himself and of the world. He is the trickster who packed down the Earth with his wings so he would have some place to stand; who snuck the sun out of a shaman's box; who loosed the rivers and the fish (he stole them from two beaver brothers); and who set in motion the birth of the first humans (with the help of various shellfish and a storm). The roles of observer and transformer are, for Raven, inseparable. Whatever

he watches, he ends up changing. Sustained observation gives him ideas, and those ideas lead to action. What he sees leads to what he gets. [24]

Likewise, what we watch, we change. Attending mostly to the dramatic, we neglect the slow. Monitoring flawed gauges such as stock prices, consumer confidence, and gross domestic product, we organize our institutions to generate high stock prices, confident consumers, and the grossest domestic product we can muster. Conversely, because we do not watch them, we do not get the healthiest lives, the strongest communities, or the most vibrant ecosystems. The ultimate aspiration of the Cascadia Scorecard is to give us those things.

1. HEALTH



"You are made of more cells than there are stars in the Milky Way galaxy," write Peter Ward and Donald Brownlee, "and each cell is a miniature city with its own highways, factories, waste-processing plants, and a coil of DNA recording the genetic instructions necessary to make a copy of you." Ward, a geologist, and Brownlee, an astronomer, both at the University of Washington, are inclined by virtue of their disciplines to Raven-like perspectives. They continue, "The cells in turn have combined to make a complex organism that can move, eat, breathe, reproduce, repair itself, think, and dream. Yet as astonishing as our biology is, we are also mortal, forever in peril of disease, puncture, or the inevitable dissolution caused by the wear and tear of time."[1]

Northwesterners, more than most people, have proved adept at postponing the inevitable, keeping their internal galaxies functioning for extended periods. In 2001, the most recent year for which data are available across the entire region, a newborn could expect to walk the Earth for nearly 79 years. This lifespan—the average number of years an infant is likely to survive given current rates of mortality—was longer by 42 days than life expectancy of just a year earlier. In the last two decades, lives have stretched by three years in the Northwest states and five in British Columbia (see Figure 1).

Life expectancy is the best single measure of a population's health. It reflects everything that can shorten human existence, from infectious diseases to traffic accidents to cancer. It is statistically reliable and closely correlated with narrower health measures, such as infant mortality and rates of preventable illness. Contrary to first impressions, it does not simply reward medical practices that extend lives without improving them: across nations, every added month of life expectancy

tends to bring more than a month of good health. In fact, most gains in longevity result from reduced fatalities among people under the age of 55.[2]

The residents of Cascadia are generally healthier than the people who reside in other parts of Canada and the United States (just as their totemic bird, the raven, has a longer life—30 years in the wild, 60 in captivity—than most avians). Lifespans in the Northwest states exceed the US average by about 12 months. In life expectancy, Washington, Idaho, and Oregon place 10th, 14th, and 19th, respectively, among American states. But British Columbia is among the world's elite: over most of the past two decades, British Columbia has had the highest life expectancy of Canadian provinces, 80.7 years, and Canada itself is among the healthiest nations in the world.[3]

British Columbians live about two and a half years longer than inhabitants of the Northwest states. Indeed, BC life expectancy tops that of all American states except Hawaii, and all countries except Japan (see Table 1). Largely because of the province's exceptional record, if Cascadia were an independent country, it would be the eighth healthiest in the world.

The BC health advantage is pervasive: at every age, and for virtually every major cause of death, British Columbians are less likely to pass away than other northwesterners. Between

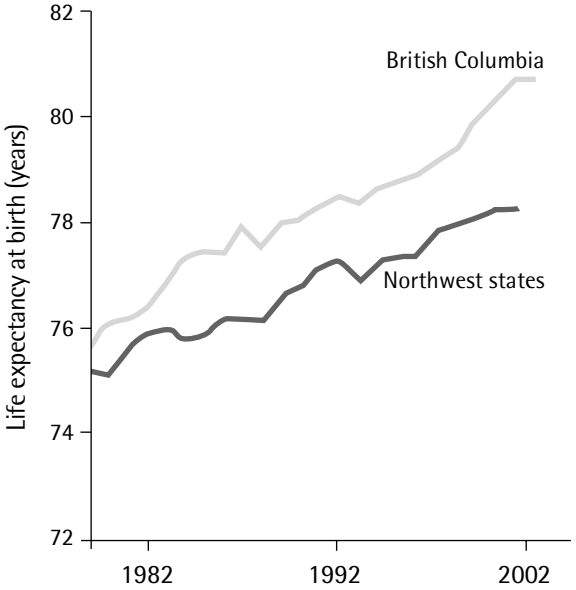


Figure 1. In the last two decades, lifespan has increased by three years in the Northwest states and five years in British Columbia.

World rank		2001 life expectancy (years)
1	Japan	81.3
	British Columbia	*80.7*
2	Sweden	79.9
3	Iceland	79.6
4	Canada	79.2
5	Spain	79.1

Table 1. If British Columbia were an independent nation, its life expectancy would rank second in the world.

The United States' life expectancy ranks 26th in the world

the ages of 15 and 24, accidents—largely traffic-related—are the leading cause of mortality in every Northwest jurisdiction; yet young Washingtonians are 50 percent more likely to perish in an accident than their BC counterparts. Likewise, suicides among the 15-to-24 age group are nearly three times more common in Washington than in BC; dying of homicide, about four times more likely. Later in life, British Columbians are far less prone to die of heart disease and slightly less likely to fall victim to cancer.

It's tempting to attribute British Columbia's longer life expectancy to its health care system. The province provides universal medical insurance, while one in eight residents of the Northwest states has no such coverage. But greater access to health care may not, by itself, explain British Columbia's longer lifespans. Among US states, for example, the percentage of uninsured residents is a poor predictor of longevity; health insurance apparently doesn't guarantee health. Similarly, spending on medical care is poorly correlated with health. Residents of the Northwest states spend 12 percent less per capita on health care than the US average, but live longer. And the United States spends more on health care per capita than any other nation, yet its life expectancy ranks 26th in the world, trailing not only most industrial democracies but also Cyprus and Costa Rica.

Indeed, many specialists argue that health care systems focus too much on treatment and not enough on prevention. Treatment is costly; prevention can be cost-effective. And changing individual behaviors is, under any reckoning, a key to minimizing disease. Smoking, excessive alcohol consumption, and, increasingly, obesity are major drags on the region's life expectancy. They contribute to, among other ills, the cancer and heart disease responsible for half of all deaths (see Figure 2). In Oregon, fatality rates from diabetes—some forms of which are linked to rising body weight and lack of exercise—have nearly tripled over the past two decades; in Washington, they have almost doubled. Other preventable causes of death also shorten lives: cars and firearms

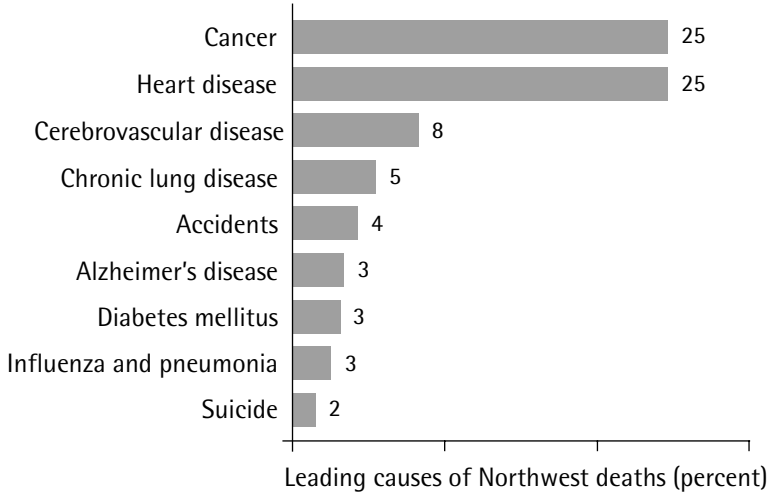


Figure 2. Cancer and heart disease accounted for half of all Northwest deaths in 2001.

were instrumental in half of the deaths of Idaho 15-to-34-year-olds, and lowered the state's life expectancy by nearly a year.

Like individuals, communities can make choices that promote health. Good community design, for example, encourages exercise, but sprawling housing promotes sprawling waistlines by limiting opportunities for human-powered transportation. The effects of neighborhood design on exercise are small, but even small improvements matter. After the age of 25, Americans put on about a pound or two each year—a gain that would be eliminated by walking just a few extra minutes each day. British Columbia's more pedestrian-oriented urban design (see Chapter 5, "Sprawl") may explain why obesity is about one-third less common in the province than in the Northwest states.

And social environments matter too. Social connectedness—the number and strength of a person's ties with family, friends, and community—is an excellent predictor of health, particularly as people age. Indeed, some research suggests that a lack of social ties can increase the risk of death nearly as much as smoking or obesity. Apparently, loneliness kills.

Unlike ageless Raven, each generation of human northwesterners ultimately meets its end, leaving its place open to the next. But the past century's unprecedented extensions of health need not slow; they can even accelerate.

If lifespan gains continue apace, British Columbia will reach Japan's best-in-the-world mark of 81.3 years in 2006; the Northwest states will follow in 2023. Or, if Cascadia begins reckoning its success by this Scorecard, it can reach that benchmark sooner, becoming the place that affords its citizens the most time in the world.

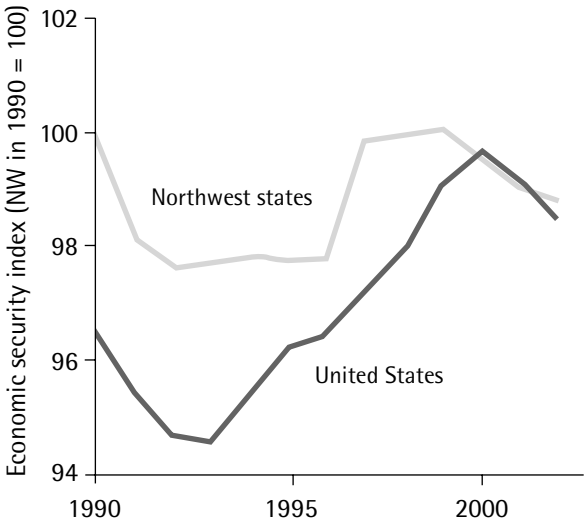
2. ECONOMY

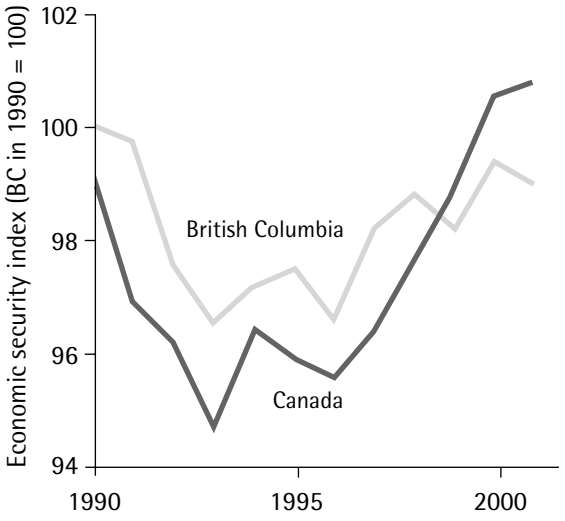
Robert Bringhurst, the British Columbia poet and translator of classical Haida myths, writes of Raven, "He finds his way to everything worth having, but his greed is our gain, for when he has stolen it for himself, he will lose it or tire of it soon, or in a fit of generosity, he will deliberately give it away. One way or another, it will be shared." By Western standards, Raven is a curiously selfish creator-god, but he does get the job done; his actions distribute the fruits of the world's productivity. Before contact with Europeans, his followers fulfilled the same function through potlatch ceremonies, which distributed the wealth of prosperous families among their kin and neighbors. The Cascadia Scorecard tracks the equivalent slow news trend: whether Cascadia's productivity is benefiting its people.[1]

By conventional measures, the Northwest economy is vastly richer than it was even in 1990, when it was already affluent beyond the wildest dreams of generations past. In the Northwest states, for example, total economic output has risen by more than 63 percent since 1990; per capita personal income grew by 23 percent.[2]

But such indicators tell little about the fortunes of ordinary people. The Cascadia Scorecard's economic security index—an original composite of four measures—gauges the economy's real-world effects on working families. It integrates incomes of typical households, the unemployment rate, the share of northwesterners living in poverty, and the share of children living in poverty.

By this measure, the Northwest states have been underperforming the United States over the past decade, while British Columbia has been underperforming Canada. In fact, economic security in Cascadia is slightly worse than it was in 1990 (see Figures 1 and 2). The Northwest's





lackluster performance is evident in each of the four components.

In 2002 a single American who made less than $9,359 fell below the federal poverty line; the figure for a single parent with one child was $12,400. By these definitions, which are constrained compared with other industrial democracies, one in nine residents of the US Northwest—and one in seven children—lives in poverty.

The Northwest states added roughly 380,000 people to the ranks of the poor between 1990 and 2002, as the poverty rate crept from 9.7 percent to 11 percent. The steepest increase in poverty occurred in the early 1990s, but the boom years of the mid- and late 1990s did not undo the damage.

Nationally, poverty in the United States followed a different trajectory: the poverty rate dipped to its lowest level in decades in 2001, though 2002 appeared to reverse this trend. The three Northwest states alone accounted for about one-third of the nation's 1-million-person

Figures 1 and 2. The Northwest has lost ground since 1990 in economic security for its residents, while national indicators have improved. The Cascadia Scorecard's economic security index combines unemployment rates, median incomes, general poverty rates, and child poverty rates.

increase in poverty from 1990 to 2002. By 2001 the Northwest states' longstanding leadership in maintaining low poverty rates had all but vanished (see Figure 3).

In Canada, where definitions of poverty are more generous and vary more with the cost of living, single people living in big cities fall below the low-income cutoff (the unofficial poverty line) if their annual earnings are less than Can$18,371. For single parents living in rural areas with one child, the figure is Can$15,870.

For most of the 1990s, British Columbia's poverty rate—the share of people who earn less than the low-income cutoff—was about the same, or slightly lower, than the Canadian rate. But during the late 1990s Canada's poverty rate fell, a trend not mirrored in British Columbia. Since 1999 the province's poverty rates have exceeded the national average.

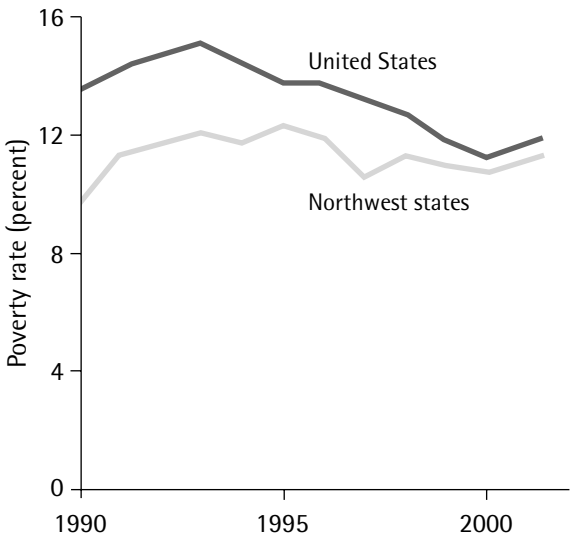


Figure 3. Unlike the United States as a whole, the Northwest states failed to register a decline in the poverty rate over the 1990s.

US and Canadian poverty rates are not directly comparable because prices and social services vary greatly between the countries, but the best international research suggests the United States has substantially more child poverty than its neighbor to the north. Given Canada's more generous social services, poverty is likely harsher south of the border. Still, by European standards, no part of the Northwest has done well at sharing prosperity with all its children. Scandinavia's child poverty rates, for example, are about one-fourth that of Canada and one-fifth that of the United States.

In the early 1990s, jobs abounded in the Northwest states: a smaller share of its workers than of American workers overall were jobless. But surprisingly, beginning in 1995—just as the high-tech boom was

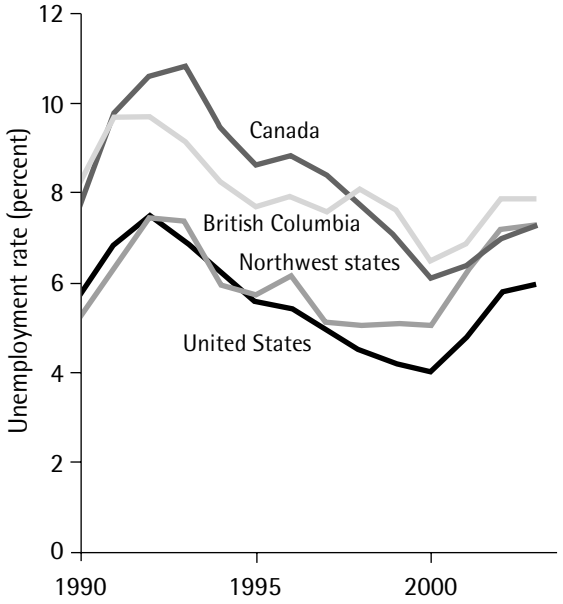


Figure 4. Unemployment rates in British Columbia and the Northwest states edged above their respective national averages in the late 1990s.

taking off—the Northwest states' jobless rate surpassed the national rate, where it has since stayed (see Figure 4).

Though unemployment rates for the Northwest states eased during most of the 1990s, they have spiked since 2000. With 2003 rates topping 7 percent, Oregon and Washington were home to some of the nation's worst unemployment. Historically, the area has struggled with higher-than-average unemployment, a phenomenon likely exacerbated by rapid population growth. In 2003 the national unemployment rate remained substantially lower than that of the Northwest states.

British Columbia has also been historically troubled by high unemployment, but for most of the 1990s, BC enjoyed lower-than-national jobless rates (see Figure 4). Beginning in 1998, however, BC unemployment exceeded the Canadian rate, a change likely brought about by struggling Asian trade partners, declines in resource industries, and trade disputes with the United States. With a 2002 annual rate of 7.9 percent, the province contends with a higher rate of joblessness than any American state.[3]

Median income is the balance point on the income ladder: half of all households earn more than the median and half earn less. In the Northwest states this bellwether of middle-class economic security has risen since 1990, but not as much as the median for the United States as a whole.

At the beginning of the 1990s, median income in the Northwest states was a little higher than the nation's (roughly $41,000 compared with $39,500). In 2001 the median-income household in these states pocketed $2,000 more (adjusted for inflation) than it had in 1990. But nationally the median-income household's earnings rose by $3,400 over

the same period. Estimates for 2002 suggest that the Northwest states may have recaptured their historical lead.[4]

British Columbia also lost its lead in median income at the close of the century. Canada's inflation-adjusted median income registered no net growth from 1990 to 2001; British Columbia's shrank by more than 4 percent, likely a result of an inflation-battling monetary policy and free-trade-related changes in the economy. The damage might have been worse had middle-class fortunes not improved in recent years in both British Columbia and Canada. Still, the province lagged the nation. Median income in 2001 was about Can$1,000 lower in British Columbia than in Canada as a whole (see Figure 5).[5]

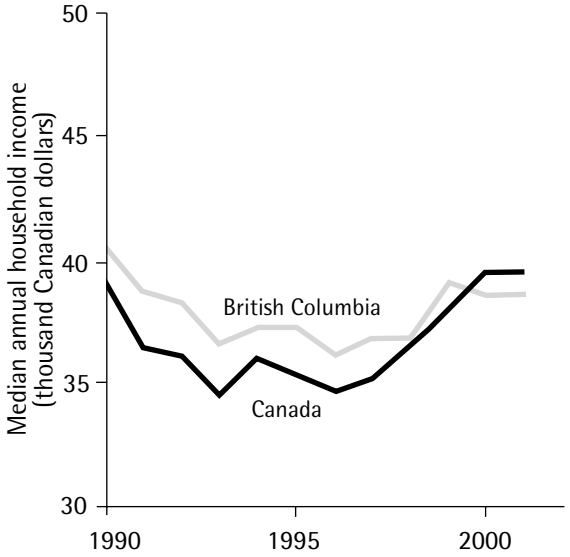
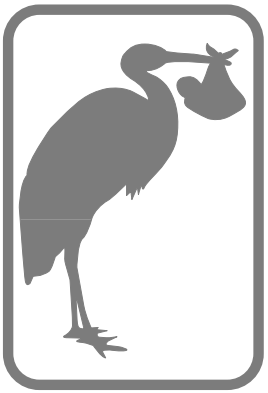


Figure 5. By 2000, British Columbia had lost its lead in middle-class, or median, incomes.

Greater economic security for the Northwest is possible: it does not require the intervention of a supernatural trickster such as Raven. The upper Midwest states of Minnesota, Wisconsin, and Iowa—which have roughly the same combined population as the Northwest states—enjoy substantially lower rates of poverty, child poverty, and unemployment and much higher median income. Just so, the prairie provinces of Alberta, Saskatchewan, and Manitoba outdo British Columbia on every measure of economic security. Achieving prosperity that improves the fortunes of ordinary families is not easy, but success surely begins with a practice learned from Raven: carefully watching the slow trends.

3. POPULATION



Raven has had an interest in humans since he discovered the first ones, on a beach, cowering in a clamshell. His ever-attentive eye spotted them from a distance, and he charmed them out with reassuring sounds. (Nonmythical ravens have voices almost as versatile as parrots.) He enjoyed their company. They were inquisitive and sociable like him, so he began keeping tabs on them. If he still is, he's probably noticed that just as northwesterners have been postponing death, they have been postponing birth.

In fact, birthrates, especially among teens, have dropped to record lows, which has helped to draw the region's population growth rate down to its slowest pace in two decades. The Northwest's women, even more than North American women in general, are choosing to have small families, later in life—a pattern that is associated around the world with improvements in women's control over their lives and, in the long run, with lessened stress on natural ecosystems.

In 2003 the combined number of residents in British Columbia, Idaho, Oregon, and Washington probably grew by just more than 1 percent, as in 2002. Still, the region's roster likely added about 20 people per hour, bringing the total human inhabitants to roughly 15.3 million (see Figure 1).[1]

Many residents of Cascadia think of burgeoning population in the region as resulting largely from inflowing migration, both domestic and international. But the natural increase in population (births minus deaths) keeps pace with migration, or nearly does. Since 1950, natural increase has contributed 44 percent of the Northwest's population growth. Excluding British Columbia, it has contributed 49 percent; in Idaho, 69 percent.

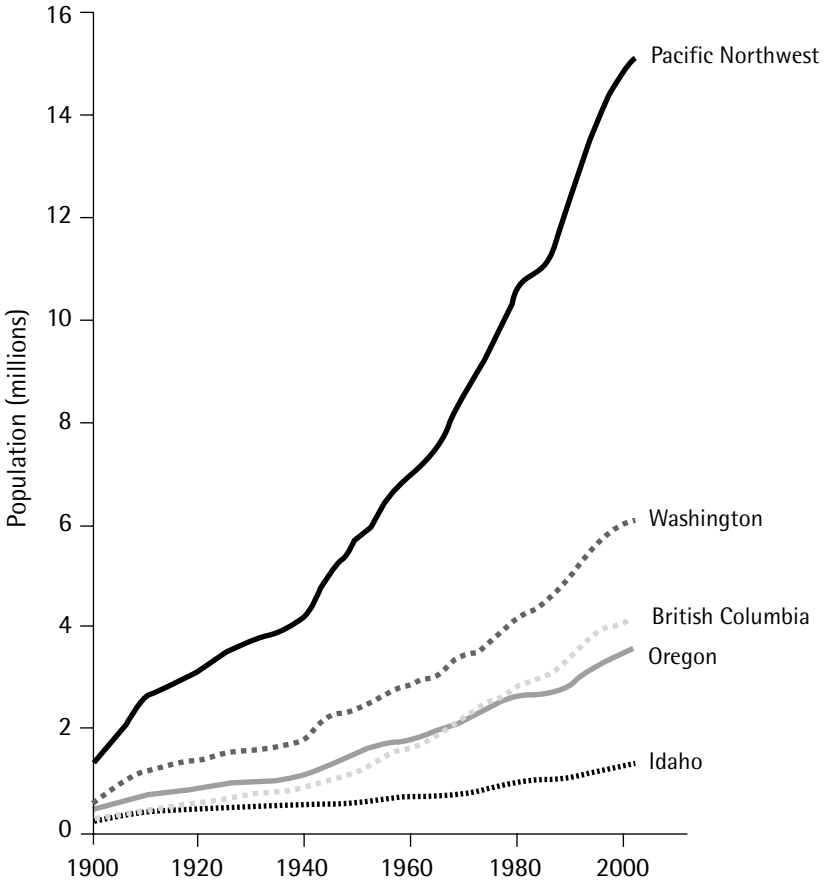


Figure 1. Despite a recent slowdown, the Northwest's population keeps expanding.

In 2002, the most recent year for which complete data are available, natural increase dropped to a smaller amount than the region has had in a quarter century. This slowing is a product of a decades-long tapering of birthrates, which are now roughly half their late-1950s baby-boom levels. The region's birthrate declined to a record low of 12.3 births per 1,000 residents in 2002. Washington and Oregon, at 13, are below the US average of 15. But lower still is British Columbia, at 9.7—below the Canadian level of 11 and in the range of such stable-population countries as Germany, Italy, and Japan.

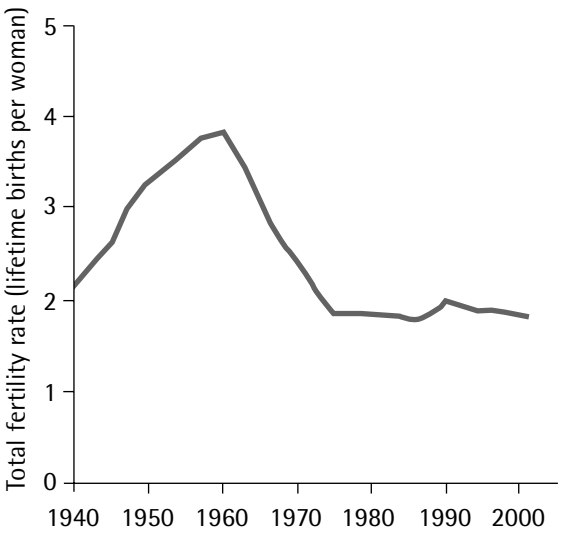


Figure 2. Northwest women average 1.8 births apiece during their lives—half as many as during the baby boom.

	Total fertility rate
British Columbia	1.4
Canada	1.5
Washington	1.9
Oregon	1.9
United States	2.0
Idaho	2.3

Rates are from 2002 except for Idaho's, which is from 2001.

Table 1. Average lifetime births per woman are highest in Idaho.

The bottoming-out of births was predictable: the baby boomers have moved beyond their childbearing years, while the unusually small "baby bust" generation born in the 1970s has entered them. But birthrates in the Northwest states will rise again soon, as the children of the baby boomers reach their peak childbearing ages.[2]

A better measure of long-term birth and family-size trends—the total fertility rate—shows more-stable birth patterns (see Figure 2). The total fertility rate is the number of babies a woman would have during her life if current birthrates didn't change over time. British Columbia's low total fertility rate, which has declined in recent years, is like that of European nations and Japan. The rates for Washington and Oregon are more stable and considerably higher, but still below the US average (see Table 1).

This trend toward smaller families is partly a result of women postponing childbearing until later in life: births to teens and 20-somethings are declining; births to 30- and 40-somethings are rising. In fact, teen births have declined to what are probably all-time lows in every state and province of the Northwest. Teen birthrates in British Columbia are the lowest in the region by far, at 13 births per 1,000 teenage women in 2002; Washington was next, at 33, followed by Oregon at 36 and Idaho at 40 (see Figure 3). In British Columbia, births to women in their

30s are likely soon to exceed births to women in their 20s, and births to women in their 40s may soon overtake births to teens. Trends in the Northwest states are similar, though less pronounced.[3]

British Columbia's lower birthrates are not the result of long-standing cultural differences. Indeed, at the height of the baby boom, the province's birthrates topped those of the Northwest states. Rather, the paucity of births is of more recent origin. First, British Columbia has far fewer accidental pregnancies than the Northwest states. Canadian women are more likely than American women to use birth control pills and other forms of contraception that have low failure rates, partly because insurance rules and nonprofit family planning clinics in Canada make them affordable. Second, the province's child poverty rates are lower than those of the Northwest states, and growing up in poverty tends to boost women's fertility in their teenage and young adult years.[4]

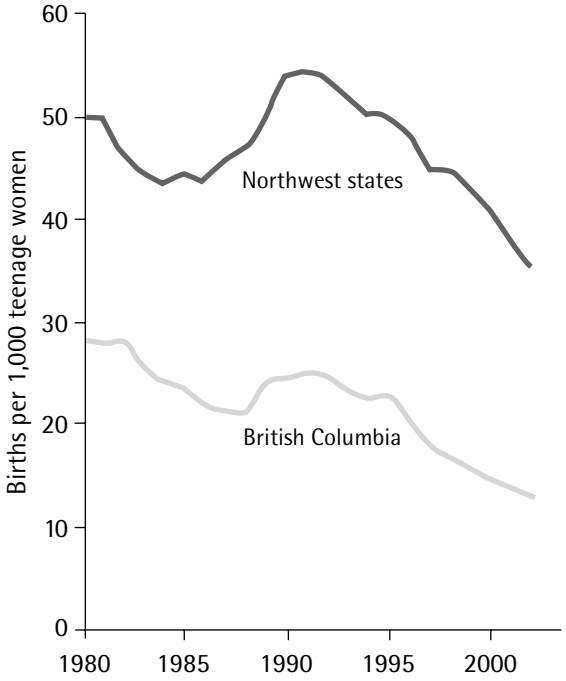


Figure 3. Teenagers in British Columbia have one-third as many babies as their counterparts in the Northwest states.

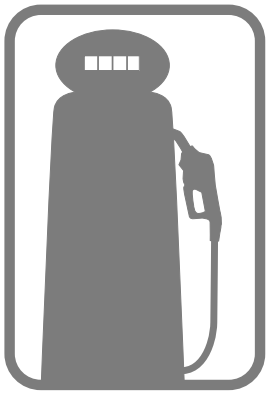
Third, British Columbia's international immigrants come from places where small families are the norm. In both British Columbia and the Northwest states, international immigrants tend to bring their family-size desires from their home country. The province's largest minority population has its origins in low-fertility China, and many BC Chinese are from Hong Kong, which has the lowest fertility rate in the world. In contrast, Latin American immigrants are the largest minority in the Northwest states, and Hispanic Americans have a total fertility rate of 2.8, compared with 1.8 among non-Hispanic whites. Of course, much of this apparent impact of cultural differences may actually reflect differing rates of poverty.

More than a third of the Northwest states' births result from mistimed or unwanted pregnancies

The Northwest states can reduce natural population increase by doing things desirable for other reasons too: curbing unintended pregnancies (more than a third of the area's births result from mistimed or unwanted pregnancies), alleviating poverty, and preventing teen pregnancies. Success in each arena is achievable. Maine and New York, for example, have lower rates of mistimed and unwanted pregnancies than the Northwest states. And teen births are less common both there and in states such as Minnesota and Iowa.

And while British Columbia outshines all American states, it too pales when compared with other parts of the world. The province's teen birthrate is double that of Italy, Japan, and the Netherlands. Germany, Japan, and most of eastern and southern Europe have smaller average families than British Columbia. And Sweden combines many of these traits. Twenty years ago, the country had already lowered its unintended birthrate to less than half the Northwest's current rate. Its women—who choose small families, late in life, and rarely have children as teens—have also come closer than their counterparts in most nations to achieving equality in education and the workplace, in government representation, and in access to health care. Emulating such accomplishments in the Northwest would improve the lives of women and children, while lightening the burden on natural resources.[5]

4. ENERGY



Raven's insatiable appetites are usually what get him in trouble, though they are also part of his charm. When he tries to steal all the salmon-filled rivers in the world from the beaver brothers who own them, for example, he cannot carry them all the way home. They spill out, one by one, across the landscape. His mythical gluttony is no doubt modeled on the real-world hungers of his namesakes, which sometimes eat so much carrion they literally cannot fly. Just so, northwesterners' appetite for natural resources is a key trend shaping the future. And energy, which connects many economic, environmental, and security issues, is the Cascadia Scorecard's indicator of that appetite—or of how well the Northwest is meeting its needs efficiently and cleanly.[1]

Northwesterners have moderated their consumption of energy in recent years, trimming their per-person use by an estimated 4 percent from 1999 to 2003 (see Figure 1). The decline was prompted by recession and higher energy prices, however, and it wasn't enough to budge energy use off the high plateau where it has been stuck since the 1970s.

The Cascadia Scorecard does not track consumption of all forms of energy; rather, it uses highway fuels and commercial and residential electricity as proxies for the larger trend. It excludes industrial electricity, for example, because the region's aluminum smelters, which have historically taken the lion's share of industrial electricity, serve global demands, not local ones. The Scorecard's energy indicator mirrors overall energy use well: between 1978 and 2000, consumption of highway fuels and nonindustrial electricity accounted for 34 percent of the total, never varying from this level by more than two percentage points. It has the further advantage of relying on the most timely sets of data.

Among northwesterners, the people of Idaho use the most energy

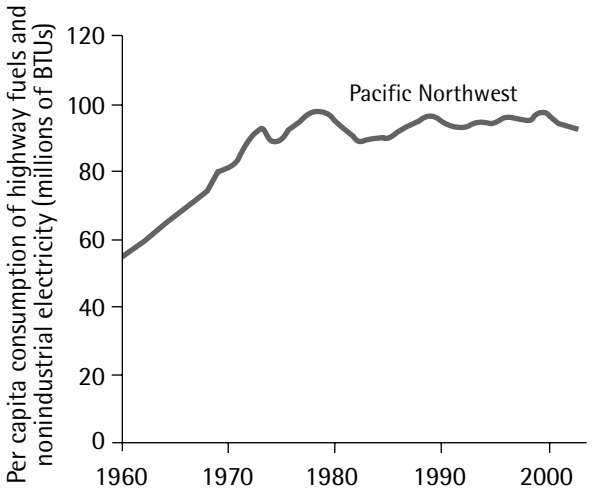


Figure 1. Per-person energy use in the Northwest has stayed at high levels since the 1970s.

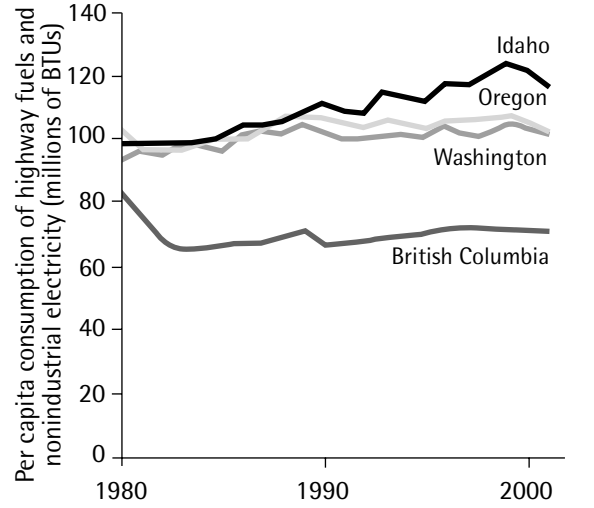


Figure 2. Idaho residents consume more gasoline, diesel, and nonindustrial electricity per capita than do other northwesterners.

and British Columbians use the least, while Oregonians and Washingtonians use similar amounts (see Figure 2). British Columbia's lower consumption is likely the result of smaller homes and more compact, transit-friendly urban design (see Chapter 5, "Sprawl"); Idaho's higher consumption may stem from the state's preponderance of trucks.

Northwesterners burn a little over a gallon (four liters) of gasoline apiece each day, on average. But per capita gasoline use was lower in 2002 than during any year since 1985, suppressed by a slow economy and rising fuel prices. In fact, every Northwest jurisdiction except Idaho slipped below its respective national average in per capita gasoline use (see Table 1).

Between 1950 and the late 1970s, gasoline demand grew apace with the economy; since then, per capita consumption has been flat or even declining. In contrast, per capita consumption of the other principal highway fuel, diesel, has continued to rise with the growth of trucking. Still, it accounts for less than 30 percent as much transportation energy as gasoline.

The region's use of gasoline has remained flat even while vehicles have grown larger: trucks (including SUVs and minivans) overtook cars in number in Idaho and Oregon and gained on them in Washington and British Columbia. Technological innovation and rapid turnover in

the vehicle fleet have prevented backsliding in fuel economy. But if northwesterners had not traded their cars for trucks in record numbers, fuel consumption per capita would have declined steeply in the 1990s, as it did during the early 1980s. Instead, average fuel economy of vehicles in the Northwest states has remained stalled since 1990.

Figures for Cascadia as a whole conceal radically different patterns of gasoline demand on the two sides of the 49th parallel: residents of the Northwest states use fully 57 percent more gasoline per person than their BC neighbors. British Columbia's lower consumption is a result of the province's more compact communities and smaller road network. Per resident, Washington has a quarter more miles of streets and highways than BC, Oregon has two-thirds more, and Idaho has three times more.

	Gasoline use *(weekly gallons per capita)*
Idaho	9.0
Washington	8.4
Oregon	8.2
British Columbia	5.3
Pacific Northwest	7.5
United States	8.8
Canada	5.9
Japan	2.3
United Kingdom	2.3
Germany	2.2

Data for Canada, Japan, the United Kingdom, and Germany from 2001; all others from 2002.

Table 1. British Columbians use less gasoline than other northwesterners, but Germans, Britons, and Japanese use even less.

Compact cities with fewer roads yield less driving. A typical car or truck in greater Vancouver travels 15 miles (24 kilometers) per day; in greater Seattle, its counterpart goes at least 19 miles (31 kilometers). And the province's more limited use of automobiles saves British Columbians a bundle; they put less than half as much money per capita into roadwork as their counterparts in the Northwest states and, despite 10 percent higher gasoline prices, their annual fuel bills are at least 25 percent lower.[2]

Still, British Columbia's record does not define the best the Northwest can achieve. Germany, Japan, and the United Kingdom use less than one-third as much gasoline per person (see Table 1). Compared with them, the Northwest seems to have an unfortunate likeness to gluttonous Raven.[3]

Cost-effective opportunities for clean-power investments are emerging more quickly than the region is seizing them

Trends in nonindustrial electricity consumption are similar to those for highway fuels: per-person demand for electricity grew rapidly until around 1980, then flattened. It's currently at an average rate of roughly one kilowatt per person—as if each person in the region operated ten 100-watt bulbs year round. Residential electricity consumption per capita has declined some since the mid-1980s, reaching its lowest level in 25 years in 2002. Electricity use in businesses, meanwhile, has increased.

Idaho residents consume the most nonindustrial electricity, followed by the people in Washington and Oregon. All three states exceed the national average for electricity use, likely because a history of cheap electricity has fostered widespread installation of electric space heaters and electric water heaters. These two appliances alone, which are inefficient uses of electricity and are rare in much of the rest of North America, account for more than half of residential electricity consumption in the Northwest states. Still, America's electricity consumption per capita continues to grow, rising toward the stable figures of the Northwest. British Columbians are the most efficient consumers, using less electricity than residents of the Northwest states and also less than Canadians and Americans overall.

The sources of electricity have shifted over time. Hydropower remains dominant in the region, providing roughly two-thirds of its electricity in typical years. But most of the growth in demand since the mid-1980s has been met by burning natural gas and coal, some of it in power plants far from the Northwest. Since 2000, pollution-free wind power has emerged, with the installation in the Columbia River basin of the region's first large arrays of windmills. But this welcome birth of wind pales beside the gas rush: in actual electrical output, the Northwest added 17 times as much generating capacity from natural gas as from wind in 2001, 2002, and 2003.[4]

The Pacific Northwest has long been an innovator in clean power—the combination of improved efficiency with renewable energy—but it is lagging of late. The absolute potential of clean energy is mind-boggling: the midday summer sun delivers a kilowatt of power to every

square meter of the Earth's surface that it strikes. More importantly, cost-effective opportunities for clean-power investments are emerging more quickly than the region is seizing them. The best recent assessment of efficiency and renewables concludes that, with the right incentives and policies in place, the Northwest could supplant most of its existing fossil-fuel-fired electric power plants by 2020. Following this energy path would save the Northwest almost half a billion dollars a year by 2020. It would also keep more of the region's energy dollars circulating locally, boost rural economies (which would provide wind power along with wood and crop residues for high-efficiency burners), make the Northwest a world leader in climate-friendly electricity, and reduce the region's exposure to recession-inducing gas price spikes.[5]

Note: chart corrected, please click here for errata: http://www.northwestwatch.org/scorecard/scorecard_errata.asp.

Northwesterners have many places to look for ways to improve their patterns of energy use. The typical resident of the Northwest states uses more highway fuels and nonindustrial electricity than a Californian or a New Yorker, and nearly as much as a Texan (see Figure 3). And Texans, despite their culture of big trucks and oil wells, far outpace northwesterners in wind-power development. Northwesterners lag even farther behind their counterparts in other industrial nations: they use nearly three times as much energy for transportation as Germans, plus about 20 percent more energy in their homes and twice as much in their commercial establishments. Indeed, Germany may be a model for the Northwest to follow: it has already reduced its emissions of climate-changing carbon dioxide by 17 percent since 1990 and has raised its wind-power capacity from just 61 megawatts to 8,700 megawatts—fifteen times the Northwest's wind capacity.[6]

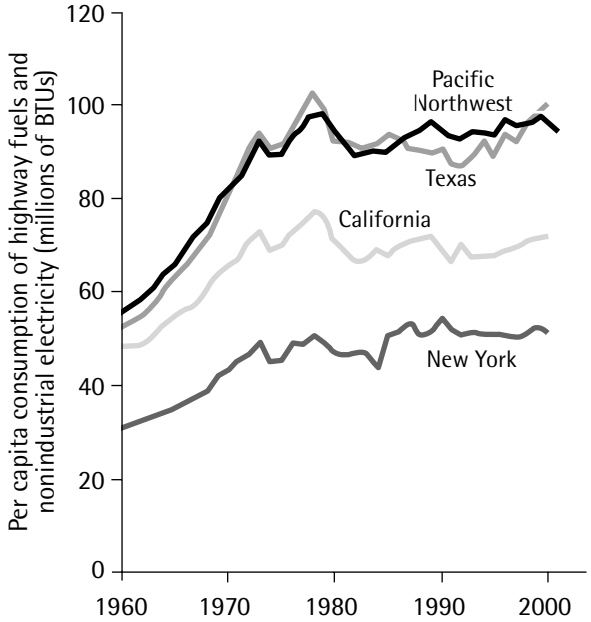
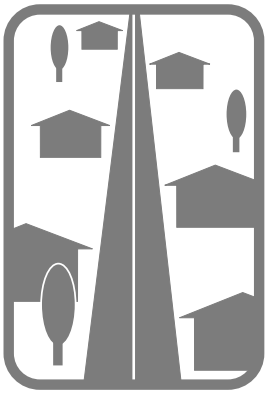


Figure 3. Northwesterners consume as much energy per person as Texans.

Closer to home, the region could emulate Vancouver, BC, in its use of highway fuels (see Chapter 5, "Sprawl") and Seattle in its electricity use. Seattle City Light, the municipal utility, owns the first large-scale hydroelectric dams in the world to win an environmental seal of approval. The utility's energy efficiency programs have been among the most ambitious in the region, if not the world; it has invested aggressively in wind power; and it has almost completed the process of eliminating its net emissions of climate-changing greenhouse gases.

If the Northwest can satisfy its resource appetites efficiently and cleanly, the benefits will spill over to other places as well, as the region attracts imitators. But to succeed, northwesterners may need to do better than Raven at sensing when they have had enough. The Cascadia Scorecard monitors their success.

5. SPRAWL



The impulse to spread out has dominated the growth of Northwest cities since World War II, but northwesterners are increasingly choosing to live in more land-conserving communities. In each of the region's three great metropolises and four midsize urban areas, the share of people living in compact neighborhoods increased over the past decade (see Figure 1 and sidebar "Are You Dense?"). And a review of new housing permits in metropolitan Portland and Seattle shows that those areas' growth management laws helped contain new development within urban growth boundaries. Still, sprawl remains the norm, the predominant pattern visible from a Raven's-eye view of the Northwest; the good news is that sprawl has decelerated.

Although sprawl refers to a set of suburban traits—compartmentalization of land use, branching street patterns, and dispersed buildings—its best single indicator is residential density, the number of people who live on each acre. Density reveals whether growing populations are consuming much or little new land, for example. And studies of more than 100 cities on four continents show that neighborhood density is the most important determinant of how much people drive.[1]

Most of the Northwest is rural, but most northwesterners are city dwellers. The region's seven most populous metropolitan areas—three large and four midsize—accounted for more than half of the population, and most of its growth, over the past decade (see Table 1). Still, these cities did not grow the same way. Greater Boise started smallest but expanded fastest; during the 1990s, its population increased by nearly half. The share of its residents living in compact neighborhoods rose from 3 percent in 1990 to 7 percent in 2000, but in absolute numbers the jump in lower-density housing dwarfed compact growth. At the

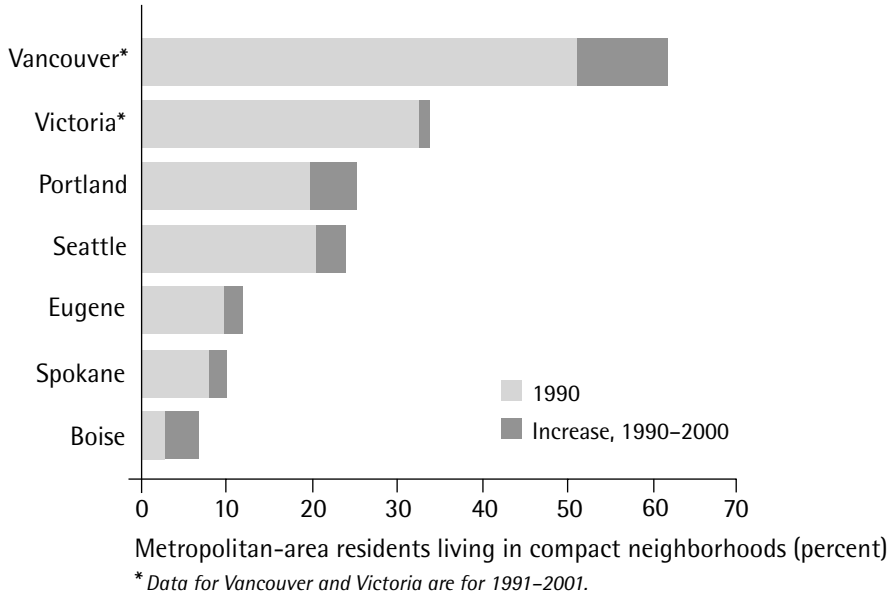


Figure 1. The share of northwesterners living in compact neighborhoods has increased.

Are you dense?	
Rural	< 1 person per acre
Low-density suburb	1–5 people per acre
Medium-density suburb	5–12 people per acre
Compact neighborhood	> 12 people per acre

time of the last census, only 1 Boise resident in 17 lived in a compact neighborhood, making greater Boise the most sprawling Northwest metropolis (see Map 1, page 41).

Among the region's midsize cities, Victoria, BC, occupies the other end of the spectrum (see Map 2, page 42). Greater Victoria has roughly the same population as the Idaho capital but five times as many residents in compact neighborhoods. In fact, with one in three of its residents living in neighborhoods of at least 12 people per acre, greater Victoria has controlled sprawl better than any other Northwest metropolis except Vancouver. Still, even Victoria's success was limited. Outside of a few urban centers, most of its growth was in sprawling neighborhoods. As a result, greater Victoria gained slightly more residents at sprawling densities than in compact neighborhoods over the decade ending in 2001, the time of Canada's last census.

Metro area	Population	Growth during past decade (percent)
Seattle (3 counties)	3,045,000	19
Greater Vancouver Regional District	2,013,000	26
Portland (4 counties)	1,790,000	27
Spokane (Spokane County)	418,000	16
Eugene (Lane County)	323,000	14
Victoria (Capital Regional District)	314,000	12
Boise (Ada County)	301,000	46
Total, 7 metro areas	*8,200,000*	*22*
Total, British Columbia and Northwest states	*14,739,000*	*18*

Population counts are for 2000 in the United States and 2001 in British Columbia. Population totals may not add due to rounding.

Table 1. More than half the Northwest's population is concentrated in three large and four medium-size metropolitan areas.

The medium-size cities of Spokane, Washington, and Eugene, Oregon, exhibit superficially similar growth profiles (see Maps 3 and 4, pages 43 and 44): their populations both increased at a moderate pace, and both have a far smaller share of residents in compact neighborhoods than does Victoria. But a fine-grained look at the two cities' growth patterns shows substantial differences. In Spokane, the number of residents in sparsely populated suburbs (areas with between 1 and 5 people per acre) increased by 10,000 over the 1990s. But in Eugene, the number living at such densities actually declined, the result of channeling growth into existing suburbs. Likewise, greater Spokane's rural outskirts (areas with less than 1 person per acre) grew by 12,000 people, as large-lot housing proliferated. Over the same period, greater Eugene's rural population held roughly constant. Apparently Oregon's growth management policies, in place since the 1970s, helped limit sprawl's conversion of rural lands while concentrating development in established neighborhoods.

Like Spokane and Eugene, the metropolises of Seattle and Portland had significant similarities in their growth patterns. In both cities, about a quarter of residents lived in compact communities at the time of the last census, up from about one in five a decade earlier. But like Spokane, greater Seattle experienced a net gain in the number of residents living in the most sprawling suburbs and exurbs; and Portland, like Eugene, saw an absolute decline in low-density and rural sprawl. Again, Oregon's growth management policies likely accounted for the difference. Clark County, the part of greater Portland that lies in Washington, suffered far more exurban sprawl during the 1990s than did the rest of the metropolitan area (see Map 5, page 45).

Still, Washington's Growth Management Act, which took effect in the mid-1990s, is showing some success in containing sprawl. The law required fast-growing counties to establish urban growth boundaries and to channel new growth inside those boundaries. An analysis of greater Seattle's housing permits shows that the share of permits issued for new dwellings outside the urban growth boundaries declined steadily over the decade. In 1991 more than one in four new housing units authorized in King, Snohomish, and Pierce counties was outside what would later become the urban growth boundaries. By 2001 that share had fallen to one in eight. King County, which contains Seattle, fared best, ending the decade with only 1 of each 20 new homes slated for construction outside the urban boundary—a record nearly as good as those of Washington and Multnomah counties, the most urbanized parts of greater Portland.

Likewise, the share of new King County housing authorized in already-dense neighborhoods rose from 17 percent in 1991 to 29 percent in 2001. Such infill development reduces environmental impacts because it consumes little land and shows the greatest promise for making transit accessible and cost-effective for residents. In this regard, at least, greater Seattle has fared better than greater Portland in recent years: fully 18 percent of greater Seattle's new housing permits in 2000 and 2001 were

located in compact neighborhoods, twice the share in the three Oregon counties of Portland (see Table 2). Despite these successes, the Seattle area's permitting agencies authorized some 46,000 houses and apartments outside the urban growth boundary over the decade (see Map 6, page 46), including 22,000 after the state-mandated growth management plans went into effect (some of these units were likely grandfathered in when the new rules were adopted).

Density of existing neighborhood, 2000	Share of new housing units, 2000–2001 (percent)	
	Portland	Seattle
0–1 people per acre	11	20
1–5 people per acre	32	38
5–12 people per acre	47	24
12 or more people per acre	9	18

Table 2. Compared with greater Portland, Seattle-Tacoma is channeling more development into high-density neighborhoods and into low-density sprawl.

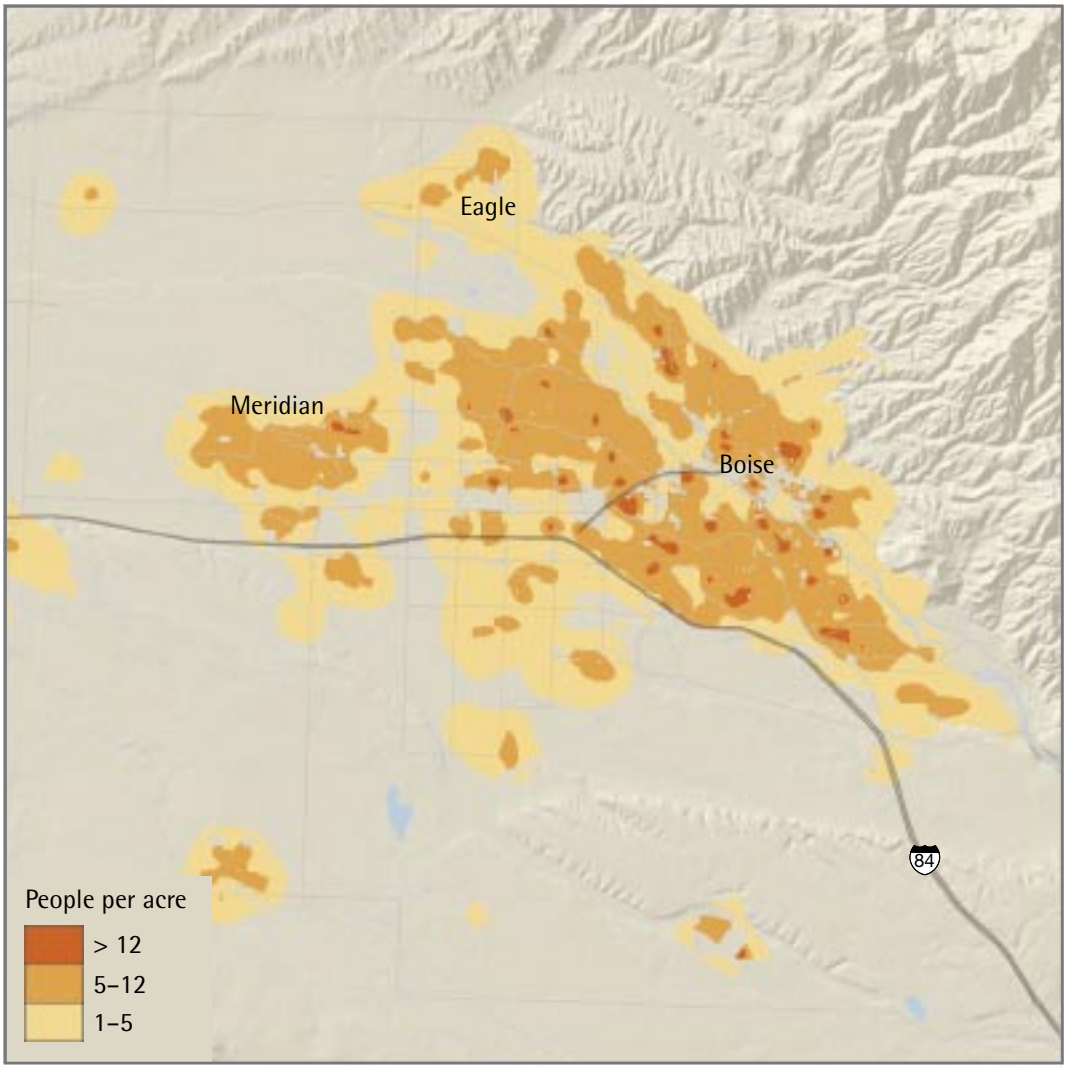
Among US cities, Portland has earned acclaim for its smart growth policies—and rightly so. A comparison of the Portland area's expansion over the 1990s with that of four similar-size US cities showed that the Oregon city lost the smallest amount of rural land, sustained less sparse suburban and exurban development, and had greater increases in the share of population living in urban zones than any of the other cities studied. But Portland does not hold a candle to the Northwest's clear leader in compact growth, Vancouver, BC (see Map 7, page 47). In 2001, more than six in ten residents of greater Vancouver lived in compact neighborhoods, almost twice as large a share as in any other Northwest metropolis.[2]

Vancouver has natural and historical advantages in containing sprawl: ocean and mountains constrain the city's land supply; province-wide legislation has protected nearby farmland, among the richest in British Columbia, in an Agricultural Land Reserve that is off-limits to development; and a fortuitous decision decades ago not to build an urban freeway system kept the city center intact while slowing the development of auto-dependent suburbs. Yet despite these advantages, greater Vancouver has a spotty record in some aspects of smart growth: the metropolitan area overall has done poorly in creating new jobs near housing centers; big-box stores, the hallmark of low-density retail, are

taking hold in the city's outskirts; and many greater Vancouver residents, particularly in recently developed areas, still depend exclusively on cars for transport. And notwithstanding its improvements in recent years, Vancouver's overall urban density still ranks below that of eastern Canadian cities such as Montreal and Toronto, and far behind such European metropolises as Vienna, Zurich, and Munich.[3]

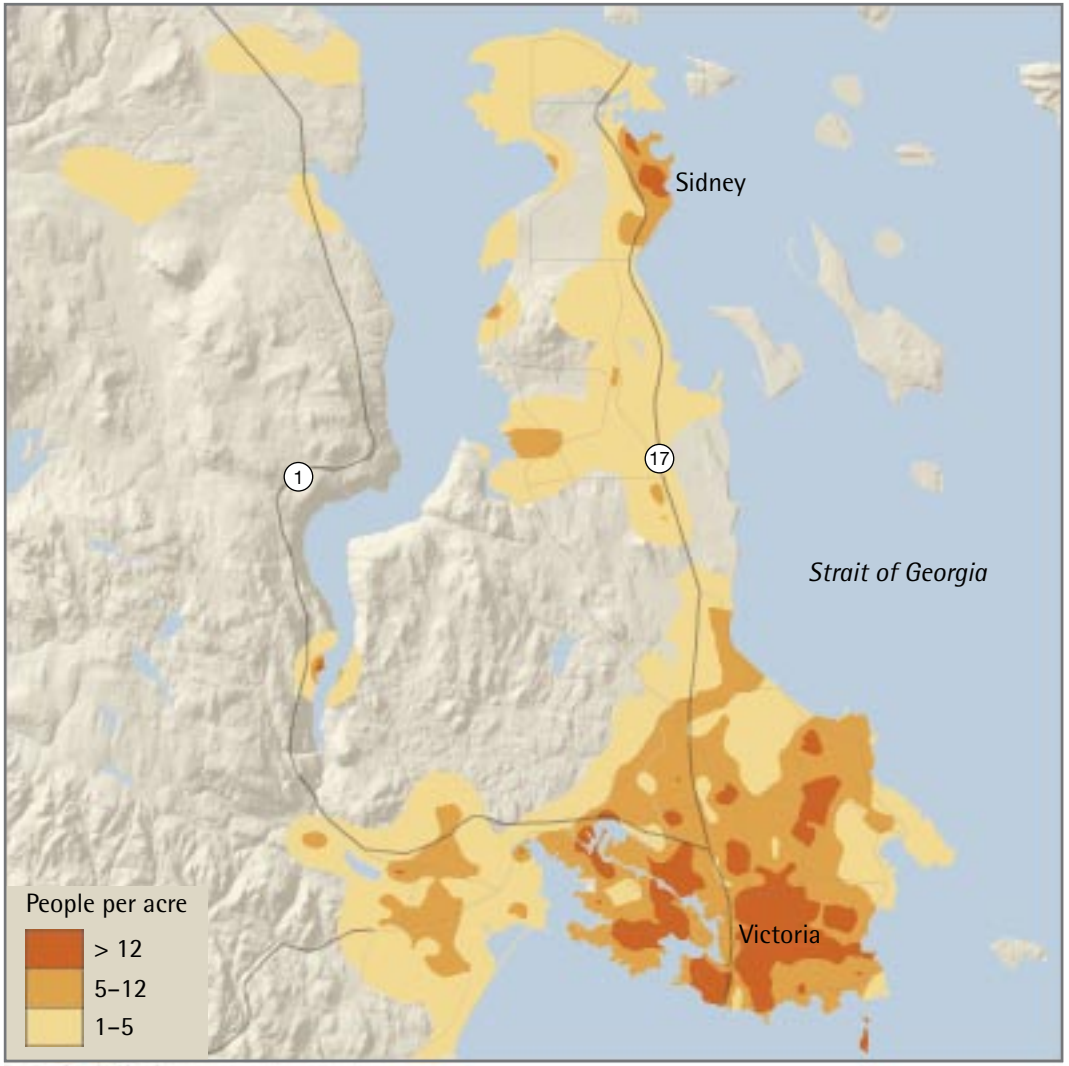
The varied record of Northwest cities shows that population growth does not inevitably lead to sprawl. Instead, sprawl results from public policy and conscious choices. Idaho lacks a comprehensive growth management strategy, as evidenced by Boise's low density. Oregon's growth management laws have slowed sprawl. Washington's more recent laws are beginning to take hold. But at current rates of improvement, decades will pass before the cities in any of the Northwest states can hope to match the record that British Columbia's two largest urban areas have already achieved.

MAP 1. BOISE-AREA POPULATION DENSITY, 2000



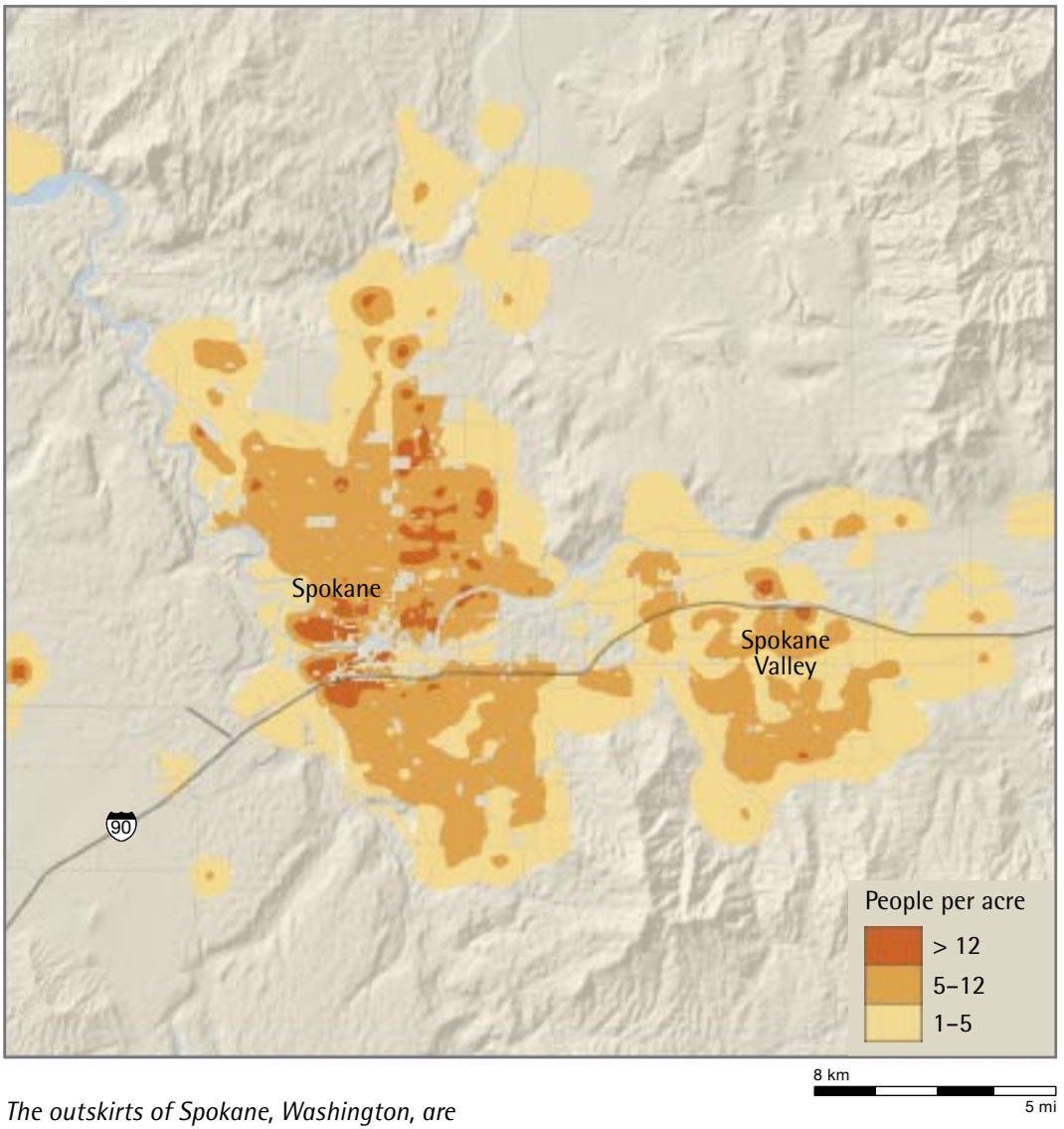
Boise, Idaho, is the Northwest's most sprawling metropolis. Map by CommEn Space, Seattle. Also see animated versions at www.cascadiascorecard.org.

MAP 2. VICTORIA-AREA POPULATION DENSITY, 2001



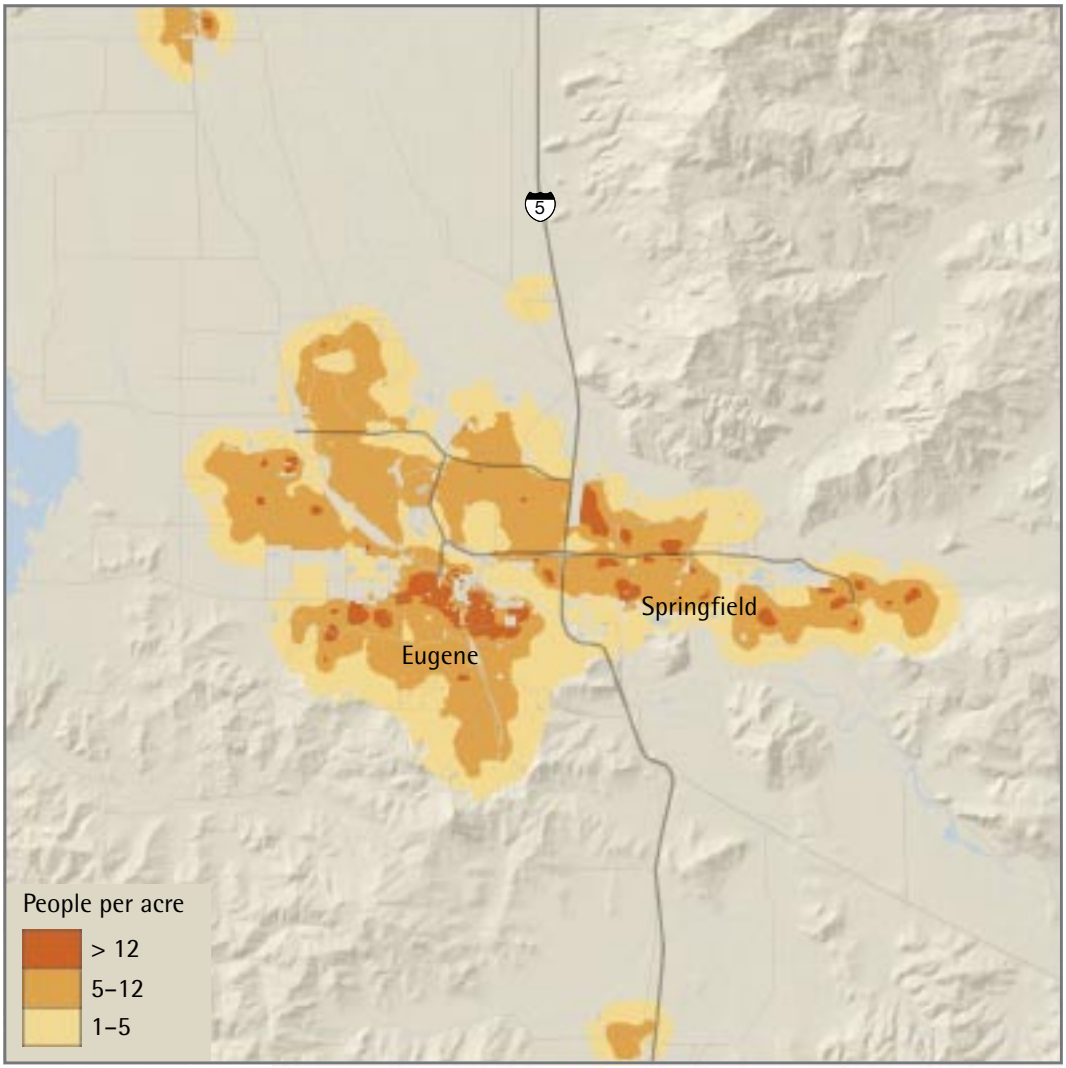
Among the Northwest's midsize cities, Victoria, British Columbia, is a leader in compact growth. Map by CommEn Space, Seattle.

MAP 3. SPOKANE-AREA POPULATION DENSITY, 2000



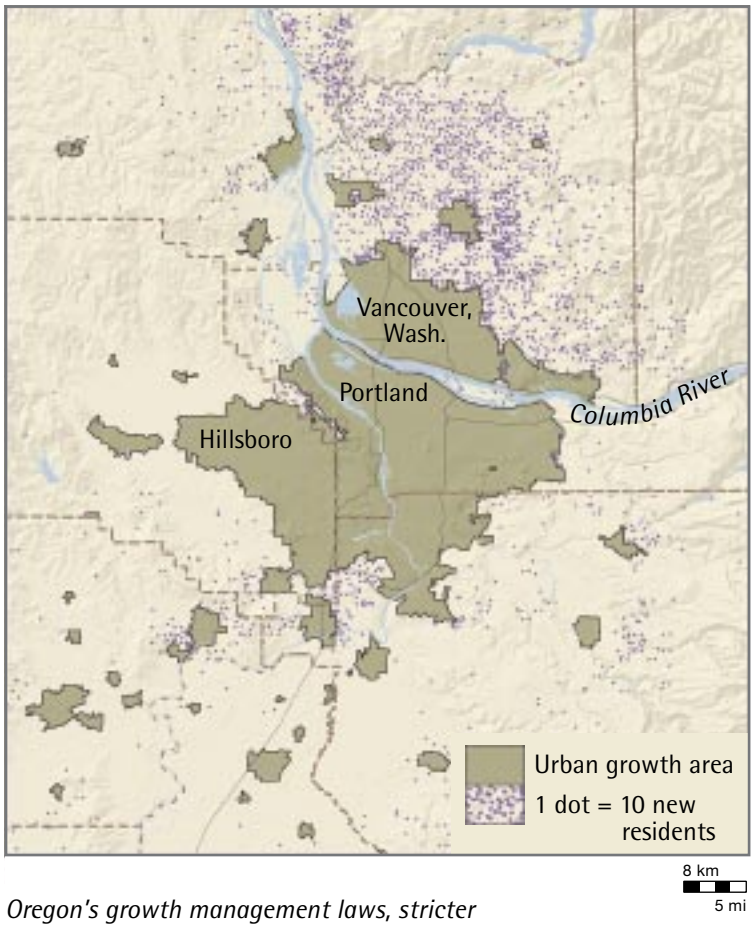
The outskirts of Spokane, Washington, are dominated by low-density housing. Map by CommEn Space, Seattle.

MAP 4. EUGENE-AREA POPULATION DENSITY, 2000



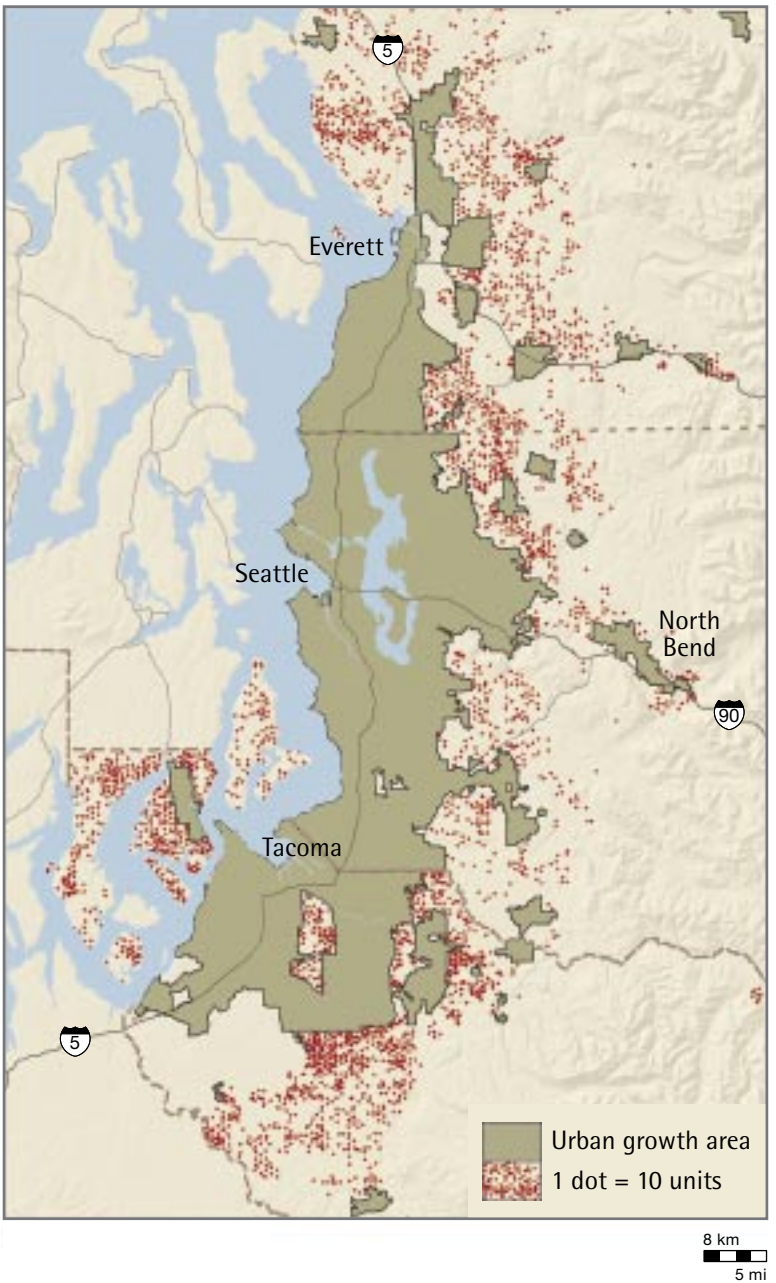
Though not nearly as densely populated as Victoria, the Eugene, Oregon, area is slightly more compact than either Spokane or Boise. Map by CommEn Space, Seattle.

MAP 5. PORTLAND-AREA RURAL SPRAWL, 1990–2000



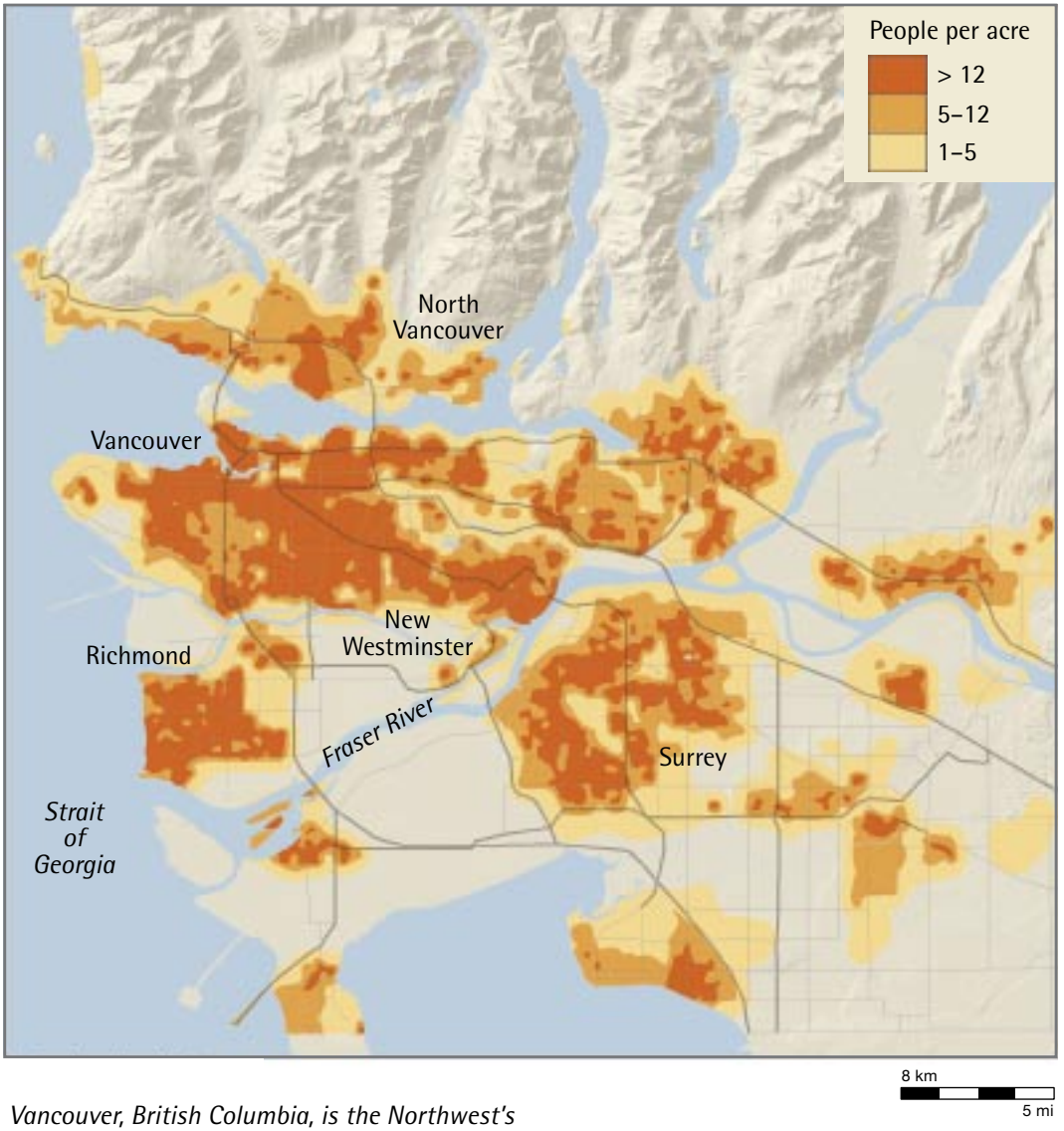
Oregon's growth management laws, stricter than Washington's and in place since the 1970s, have limited sprawl on rural lands. Map by CommEn Space, Seattle.

MAP 6. SEATTLE-AREA RESIDENTIAL BUILDING PERMITS OUTSIDE GROWTH BOUNDARY, 1991–2001



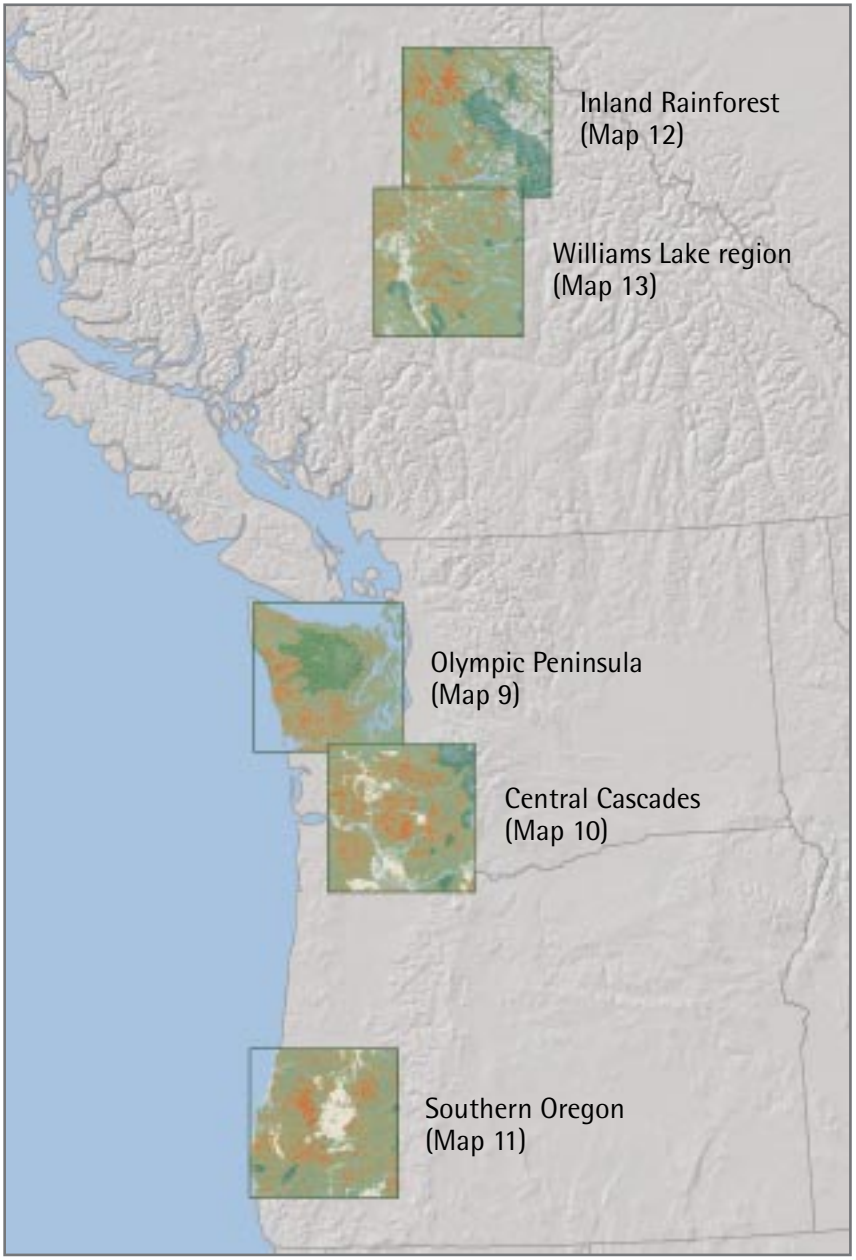
Despite recent successes in growth management, Seattle-area jurisdictions authorized 46,000 residences outside the urban growth boundary from 1991 through 2001. Map by CommEn Space, Seattle.

MAP 7. VANCOUVER-AREA POPULATION DENSITY, 2001



Vancouver, British Columbia, is the Northwest's smart-growth leader, with six out of ten residents in compact communities in 2001. Map by CommEn Space, Seattle.

MAP 8. THE CASCADIA SCORECARD'S FIVE FOREST STUDY AREAS



The areas monitored by the Scorecard include 29.2 million acres of forest, an area about two-thirds the size of Washington. Map by CommEn Space, Seattle. Also see animated versions at www.cascadiascorecard.org.

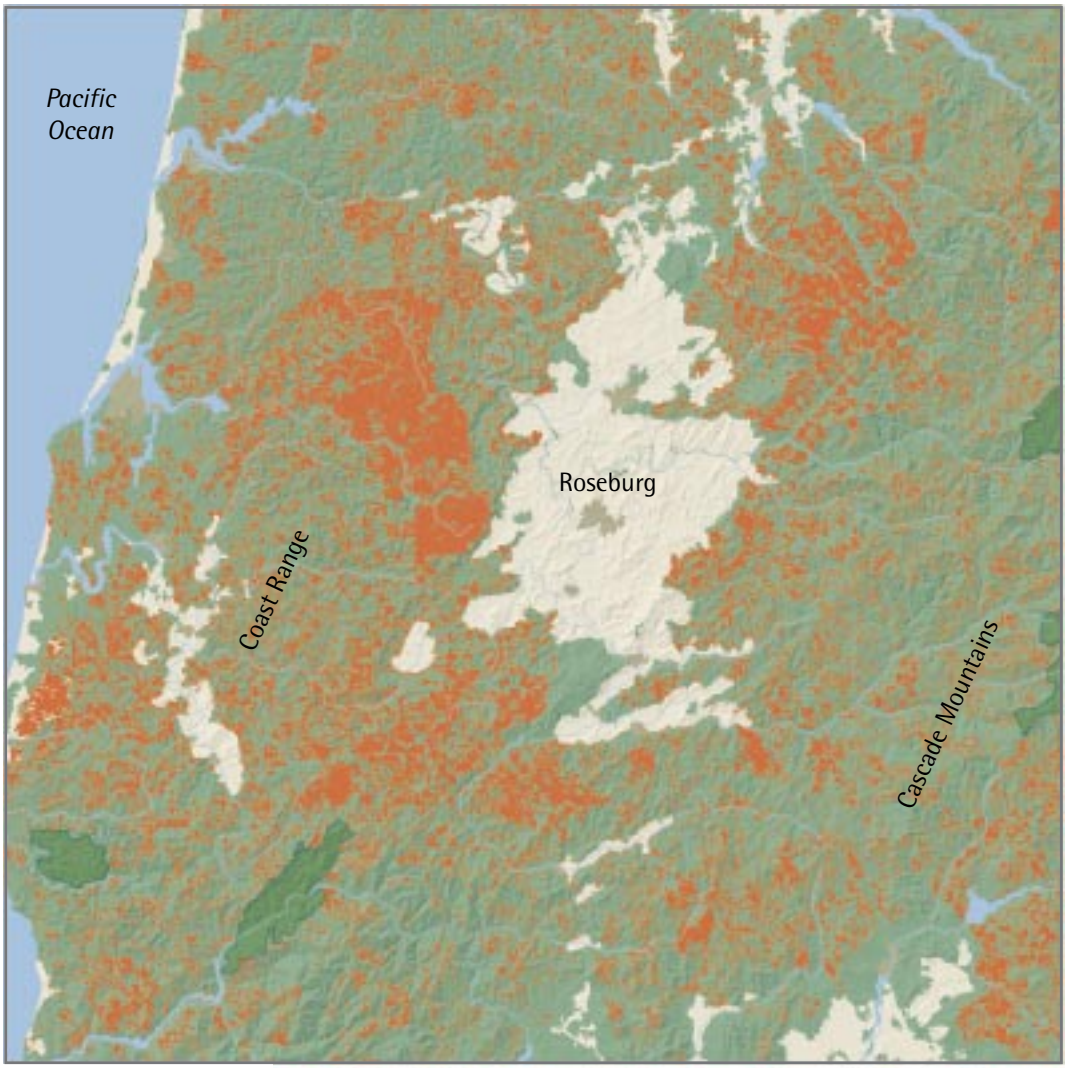
MAP 9. CLEARCUTTING ON THE OLYMPIC PENINSULA, WASHINGTON

In the Olympic Peninsula, clearcutting felled 29 percent of all forests—and 36 percent of forests without federal protection—from 1971 to 2002. Map by CommEn Space, Seattle.

MAP 10. CLEARCUTTING IN THE CENTRAL CASCADES ALONG THE COLUMBIA RIVER

More clearcutting occurred in the Central Cascades than in any other study area—more than 1.7 million acres from 1971 to 2002.
Map by CommEn Space, Seattle.

MAP 11. CLEARCUTTING IN SOUTHERN OREGON



In this region of southern Oregon, home to many vulnerable species, 27 percent of forestland has been clearcut since 1971. Map by CommEn Space, Seattle.

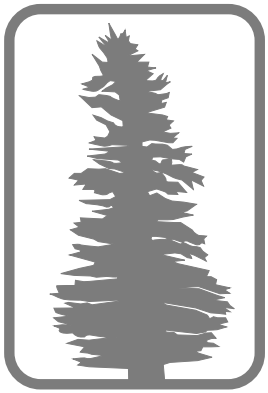
MAP 12. CLEARCUTTING IN THE INLAND RAINFOREST, BRITISH COLUMBIA

In a region that includes a globally unique ecosystem, 19 percent of mostly virgin forest was clearcut between 1976 and 2002. Map by CommEn Space, Seattle.

MAP 13. CLEARCUTTING IN THE WILLIAMS LAKE REGION, BRITISH COLUMBIA

Clearcuts leveled 20 percent of the forests—most of them previously untouched—in the Williams Lake region between 1976 and 2002. Map by CommEn Space, Seattle.

6. FORESTS



From Raven's view, dense evergreen forests have long defined the terrestrial ecosystems of the Pacific Northwest. For thousands of years, change was subtle or fleeting—shifts in climate and ecology, sporadic fires and pest outbreaks—and half of Cascadia remained covered with trees. But over the past century, the forests have suddenly given way. Mature woods inhabited by a rich array of species have yielded to fields of stumps and to young, uniform stands of trees. In the past three decades, proliferating clearcuts have been the most visible sign of this transformation.

Tracking clearcuts—places where nearly the entire forest has been cut down—provides a rough gauge for how extensively humans have altered the forests of the Northwest, and for how effectively northwesterners are safeguarding their distinctive natural heritage. Clearcuts of old-growth forests cause long-lasting simplifications of those natural communities. Even the many clearcuts that now occur in second- or third-growth stands are signs of disrupted ecosystems and a general indicator of wood-products consumption. Clearcut logging alters natural ecosystems, constricting the habitat for old-forest species, which cannot survive in immature second-growth stands. And all forms of logging emit greenhouse gases, which are responsible for global warming, and require road building, which causes erosion and degrades streams.[1]

To measure the change in Northwest forests, the Cascadia Scorecard monitors clearcuts evident in 30 years of images taken by NASA's Landsat system. In this initial report, the Scorecard is based on a set of five study areas—two in the British Columbia interior, and three in Washington and Oregon—that together represent a diverse range of the region's forests (see Map 8, page 49). Each study area, defined by a satellite

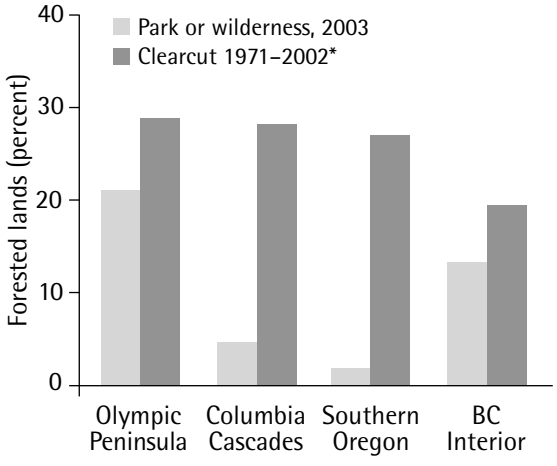


Figure 1. Between 1971 and 2002, clearcuts felled more than a quarter of the forests in areas monitored by the Cascadia Scorecard.

image, comprises more than 8 million acres (3.2 million hectares), roughly the size of Vancouver Island.[2]

In all, the five study areas contain 29.2 million acres (11.8 million hectares) of forest, an area larger than Virginia and roughly 15 percent of Cascadia's total forestland. Less than 9 percent of the forests studied is off-limits to logging in protected areas such as national and provincial parks. From 1971 to 2002, more than 24 percent—an area the size of Massachusetts—was clearcut (see Figure 1).

In the three US study areas, clearcutting was most intense in the early 1970s: it was then dispatching more than 250,000 acres each year—an acre every two minutes. Cutting tapered in subsequent years, peaked again in the late 1980s and early 1990s, then dipped to less than 80,000 acres per year by the end of the 1990s. Since 2000, clearcutting has accelerated again, reaching roughly one acre every five minutes. The Northwest Forest Plan, a product of the spotted-owl controversy, severely restricted cutting on federal land and is responsible for much of the 1990s decline in logging (see Figure 2).

The Olympic Peninsula, home to 15 animal and 8 plant species found nowhere else, is famous for its outsize trees. From 1971 to 2002, almost 29 percent of all Peninsula forestland was clearcut—more than 1.1 million acres, an area larger than Olympic National Park and its five adjacent wilderness areas (see Map 9, page 51). On a percentage basis, forests under tribal ownership were the hardest hit: 48 percent were clearcut, largely on the Quinault Indian Reservation. Private landowners clearcut 740,000 acres, 40 percent of their land. The State of Washington allowed clearcutting on 170,000 acres—more than 30 percent of its land. The Forest Service cut 110,000 acres, about 24 percent of its land.[3]

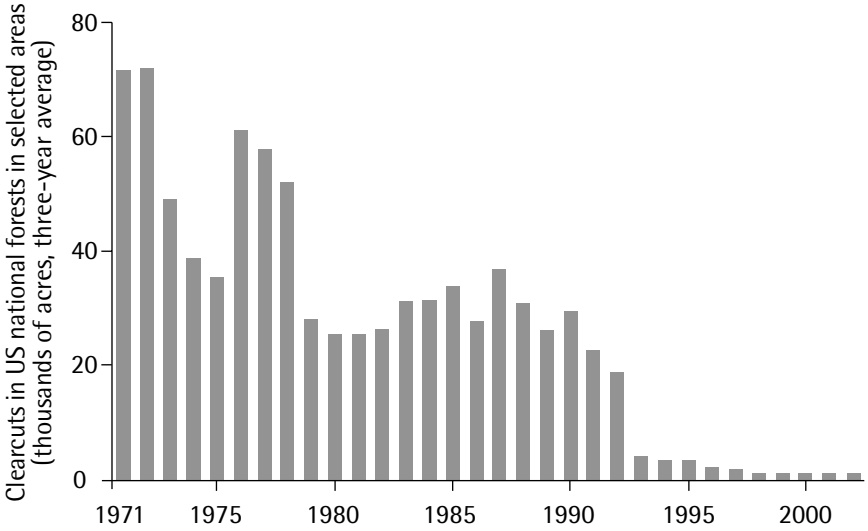


Figure 2. Clearcut logging on US national forest lands in areas monitored by the Scorecard dropped to low levels in the early 1990s.

Proportionately, the Olympic Peninsula underwent the most logging of any study area, but the Central Cascades study area lost a larger absolute amount of forest to clearcuts (see Map 10, page 52). More than 1.7 million acres of forest fell to the chain saw over the past 30 years, 28 percent of the area's forestland. Of the 3 million acres of private forestland, 39 percent was clearcut. The Forest Service cut 22 percent of its almost 1.6 million acres in the Gifford Pinchot and Mount Hood national forests almost entirely prior to 1994, when the Northwest Forest Plan arrested logging on federal land. And Washington State, which owns 1 million acres of forest, clearcut 16 percent. Not all the clearing was for logging; some made way for scattered residential development—a worrisome cause because the forest will never regenerate.

Farther south, the forested slopes of Oregon's southern Cascades, Siskiyous, and Coast Range are home to rare and endangered species like wolverine and cutthroat trout. The forests of southern Oregon were the runner-up for the sheer extent of clearcutting from 1971 to 2002. Nearly 1.7 million acres, totaling 27 percent of the region's forests, were clearcut over the past 30 years (see Map 11, page 53). Private landowners

clearcut 35 percent, or nearly 1 million acres, of their forest. The Bureau of Land Management felled trees on 319,000 acres, about 23 percent of its land, while the Forest Service clearcut another 383,000 acres, 21 percent of its land. As in the other US study areas, Forest Service cutting occurred almost exclusively before the Northwest Forest Plan was implemented in 1994.[4]

Logging in British Columbia is almost exclusively in virgin forest

In Canada, the Scorecard examines two contiguous areas in the BC interior that include a range of forest ecosystems, most notably the inland rainforest, which is similar to damp coastal forests. The forests and mountains of these study areas provide habitat for species including the threatened mountain caribou. The BC interior also has the dubious distinction of containing what is reputedly the world's largest clearcut, the Bowron Cut.[5]

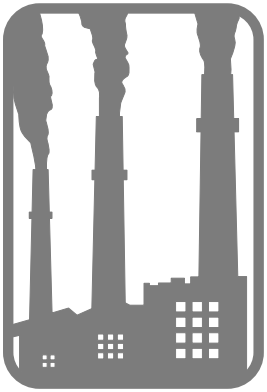
Unlike the study areas in the Northwest states, where many recent clearcuts are second- or even third-growth stands of timber, logging in British Columbia is almost exclusively in virgin forest, which is far richer in native biodiversity. Although one-tenth of the forests in the two study areas combined are protected from logging, more than 2.5 million acres (1 million hectares) have been clearcut since 1976, almost one-fifth of the original total (see Maps 12 and 13, pages 54 and 55). As in the Northwest states, cutting in the two BC study areas was most rapid in the 1970s and 1980s. The rate of cutting slowed during the 1990s but appears to have surged again since 2000. More than 91 percent of the clearcutting occurred in the 85 percent of study-area forests managed by the provincial government; First Nations and private holdings accounted for the remainder.

The mountain pine beetle and other insects have infested many interior BC forests. Recent conditions including a string of unseasonably warm winters have increased the beetles' activity, allowing them to kill an average of 30 million mature trees in recent years. Salvage logging of insect-killed trees (and sometime healthy trees too) is boosting the areas' cut.[6]

Preserving the Northwest's ancient forest ecosystems will mean conservation in concert with careful land management. If northwesterners want healthy native forests and wildlife, they can focus on safeguarding remnant virgin forests through conservation easements and expanded protected areas.

Northwesterners also need to address emerging threats to sustainable forestry. Wildfire management, such as forest thinning and road building, and industry pressure may mean revisions to the Northwest Forest Plan, likely resulting in increased logging in national forests. In British Columbia, salvage logging of pest-infected trees may turn out to be a Trojan horse for logging healthy trees, possibly even in provincial parks. And residential and commercial development pose serious threats to forests on private land. Promoting sustainable forestry practices, while also maintaining productive timberlands, is essential to reconciling the region's economy with its natural heritage.[7]

7. POLLUTION



Human bodies are made from atoms of carbon, iron, and other elements that were forged in the Big Bang and in the furnaces of now-extinct stars. These atoms, mixed and joined over eons, make up the suite of molecules that has long characterized life, from the simple H_2O—up to 70 percent of human bodies—to ornate DNA. This chemistry has been consistent over hundreds of millions of years—a long time even for Raven.[1]

In the past century, humans have introduced wholly new molecules to Earth. These synthetic chemicals, made on purpose in laboratories or by accident in factories, escape into the planet's food web, ultimately contaminating the most intimate of environments, our own bodies. Thus, a northwestern newborn is chemically similar to one born a century ago—a water-based organism that bears the saline imprint of life's birthplace in the sea. But that baby's complement of molecules has grown to carry a physical memory of the compounds that humans have added to nature's handiwork.

Indeed, all living things in Cascadia—plant and animal, human and nonhuman alike—contain within their tissues a thin soup of dozens or even hundreds of chemicals that didn't exist a century ago. While many of these chemicals are benign, some are not. The most worrisome share three characteristics: they break down slowly, persisting for years or decades; they accumulate in living tissue; and they harm functions of the body. Such persistent bioaccumulative toxics (PBTs) tend to build up through successive levels in the food chain, reaching high concentrations—or "body burdens"—in top predators such as humans.[2]

Contamination of living things by PBTs is poorly tracked. But some of the data that have been collected show that when effective steps are taken against environmental pollutants, contamination of living things

decreases. After the harmful pesticide DDT was banned, for example, its level declined in animal life. Bald eagles, once near extinction, are again thriving now that DDT levels have subsided. Likewise, the concentration of lead, a potent neurotoxin, decreased by 80 percent in the blood of North American children after it was phased out of gasoline and paints.[3]

Still, a number of the most troubling toxics are virtually unmonitored in the human inhabitants of the Northwest. To help fill this gap, the Cascadia Scorecard tracks the body burdens of three classes of persistent toxics that are now virtually omnipresent in living things.

Breast-feeding is still the healthiest choice for both mothers and infants

Toxics in the first class, called polychlorinated biphenyls (PCBs), are oily fluids that were once used widely in industrial applications but were banned in North America in the late 1970s. Those in the second, known as dioxins, are highly toxic by-products of incineration and bleaching. And toxics in the third group, called polybrominated diphenyl ethers (PBDEs), are flame retardants used extensively in furniture, fabrics, and plastics.

To gauge the body presence of these toxics, the Cascadia Scorecard includes an analysis of breast milk samples provided by first-time Northwest mothers with infants under two months of age. Results of this first round of tests were not available at the time of this book's publication, but will be released later in 2004.

Breast milk is a very good medium for measuring body burdens: it is high in the fats to which PCBs, dioxins, and PBDEs adhere; unlike blood, it can be collected noninvasively; if taken from a first-time mother, it can serve as a proxy for the body burdens for similar-aged men and for women who aren't breast-feeding; and, if collected soon after birth, it provides a good proxy for chemical exposure in the womb, when the developing fetus is most vulnerable.[4]

Although the presence of contaminants in breast milk is certainly unwelcome, it is also clear that breast-feeding is still the healthiest choice for both mothers and infants. Breast-fed babies have lower rates of chronic and infectious disease, and improved intellectual development,

compared with non-breast-fed infants. And women who breast-feed have lower levels of ovarian and breast cancers.[5]

Exposure to toxics in the womb, rather than through breast-feeding, appears to pose the greatest threat to infant development

Exposure to toxics in the womb, rather than through breast-feeding, appears to pose the greatest threat to infant development. The longest-term study of the effects of PCBs found that *in utero* exposure was strongly linked with learning and motor deficits. But postnatal exposure caused no such deficits. In fact, developmental delays were found only in children who were not breast-fed as infants; apparently breast-feeding protected children in that study from damage caused by toxics in the womb. Only in extreme instances are a mother's contamination levels high enough to warrant concern about breast-feeding.[6]

The three classes of compounds measured in the Cascadia Scorecard are linked with health problems ranging from intellectual impairments to cancer. In addition, each class represents a different facet of the body-burden challenge—past, present, and future.

PCBs are in many ways a ghost of pollution past, an indicator of how well northwesterners are cleaning up after themselves. North Americans have not manufactured PCBs in 25 years. But equipment containing PCBs is still in use, and the compounds may continue to leak for decades. Moreover, the chemical stability that made PCBs excel as industrial fire retardants has made them long-lived in the environment: they are still present in elevated levels in marine mammals, such as harbor seals and orcas. Indeed, the Northwest's orcas—regarded in Haida myth as, even more than Raven, the ultimate owners of this place—are now probably the most contaminated marine mammals on the planet. A dead female orca that washed ashore on the Olympic Peninsula in 2002 held among the highest concentrations of PCBs ever recorded in an organism: about 1 part PCB per 1,000 parts fat, an astonishing concentration for a substance more typically measured in parts per million. Reducing levels of PCBs in the Northwest will require sustained efforts to clean up past contamination, including sediments in sites throughout Puget Sound.[7]

Dioxins represent the challenge of minimizing pollution from present

sources. Among the most potent of industrial poisons, dioxins are a toxic jack-of-all-trades, wreaking havoc on a variety of bodily functions even at minuscule concentrations. They interfere with every hormone system yet tested, meddle with fetal development, delay learning and motor development in infants, tamper with the thyroid system, depress immune functions, and cause cancer, among other illnesses. The US National Academy of Sciences' Institute of Medicine is so concerned about dioxins that it suggests that women before or in their reproductive years reduce their consumption of dietary fat, particularly from animal sources, to reduce their exposure to the dioxins that tend to bind there. Much of the dioxin produced in the Northwest is the unwanted by-product of a handful of waste incinerators, wood-waste boilers, and pulp mills. Eliminating the dioxin output of these facilities would substantially reduce the Northwest's contribution to this global problem.[8]

PBDEs represent the challenge of preventing future pollution. Though ubiquitous—an ordinary foam seat cushion sold in North America may be 30 percent PBDE by weight—these flame retardants are poorly understood compared with PCBs and dioxins. But recent studies suggest that PBDEs have toxic effects similar to those of PCBs, causing permanent learning and memory deficits and behavioral changes in laboratory animals. That such a widely used additive in consumer products should turn out to pose such risks is alarming, but it is not surprising. By law in North America, medicines must clear many safety hurdles before they are approved for use, but no such requirements apply to industrial chemicals. Consequently, only about 7 percent of the 85,000 chemicals now registered for commercial use in the United States have been tested for toxicity.[9]

Most troubling, PBDE levels are surging in humans. Studies of Swedish breast milk found concentrations doubling every five years. In North America, where the manufacture and use of the most dangerous forms of PBDEs are centered, levels are already 10 to 50 times higher than in Sweden, and are rising more quickly. Median levels of PBDEs

in Vancouver, BC, breast milk samples jumped fifteenfold in the decade preceding 2002, the equivalent of doubling every two and a half years. At current rates of increase, levels of PBDEs in North Americans' bodies may soon exceed those of PCBs.[10]

A century ago, dioxins, PCBs, and PBDEs were virtually nonexistent in humans

Following the lead of the European Union and the State of California, the US Environmental Protection Agency recently negotiated with the main manufacturer of PBDEs to remove some types of the compounds from the marketplace by the end of 2004. But the most common form of PBDE will remain in production, and no effort is being made to remove from people's homes the millions of consumer products that contain the substance. Only further testing can reveal whether the alarming increases in PBDE body burdens will reverse as a result of the EPA's action.

Unlike the Cascadia Scorecard's other indicators, the measurement of toxic pollution in northwesterners' bodies does not benefit from reliable data on past trends. All that's certain is that a century ago, dioxins, PCBs, and PBDEs were virtually nonexistent in humans—and that they are now a part of us all. Future trends will depend on whether northwesterners have the wisdom to address the most obvious toxic threats confronting the region.

FLYING BLIND

Return to where this story began: Raven suspended from the sky, his beak stabbed through a cloud and his gaze cast down on the Northwest. He watches the slow news unfold. As best the Cascadia Scorecard can estimate, during each minute in 2003 he saw another acre of the region's forest clearcut. Every 3 minutes he saw another person added to the Northwest population, though birthrates were low. Every 20 minutes, the number of poor northwesterners grew by one. Every 35 minutes, he saw the region's cities sprawl across another acre of open space. Every day, he saw the region's health improve by the addition of 3 hours to the life expectancy of newborns. And day after day, week after week, he watched as supertankers unloaded fuel and as turbines generated electricity to keep northwesterners' machines operating—a rate of energy consumption that remained phenomenally high by world and historical standards.[1]

Over the past 20 years, Raven would have noticed that British Columbia did better than the rest of the Northwest. British Columbians lived longer, suffered less poverty, sprawled less, consumed less energy, and had smaller families (and fewer teen births). They also clearcut a smaller share of forests—although those forests had greater ecological significance—in the initial study areas included in the Cascadia Scorecard. Oregon and Washington, meanwhile, matched each other fairly closely in most indicators. Idaho did not do as well: it sprawled more, consumed more energy, and had larger families and more teen births.

Raven would see much good news. Four of the six Scorecard indicators for which time series are available improved from 1980 to 2003 (pollution in breast milk went unmeasured before 2003). Northwesterners became healthier. They built communities that sprawled less.

They had smaller families, later in life, suggesting that women's lives were improving. And the region's landowners clearcut less forest than did their predecessors a generation earlier.

But Raven also saw much bad news. The Northwest's sprawl and clearcutting decelerated but remained rapid, and unintended pregnancies and births to teens, though diminished, remained commonplace. Northwesterners lived longer, but not as much longer as they could have. Their economic security did not keep pace with that of North Americans overall. And despite two decades of technological progress, today's northwesterners are no more efficient in their energy use than they were two decades ago.

Comparing its record on the different Scorecard indicators, Cascadia shines in human health, where the region's lifespans are eighth in the world. Its economic security and birthrates are also good, by world standards. The region fares less well in controlling sprawl and energy consumption: despite a well-deserved reputation for innovation in energy efficiency, northwesterners still consume like Texans.

To make these comparisons more rigorous, Northwest Environment Watch (NEW) devised an experimental, three-step method for putting the Cascadia Scorecard's disparate indicators on a single scale. This method allows the Scorecard to be combined into a unified index—a counterpoint to prevailing measures such as GDP. Like any technique for comparing trends in dissimilar phenomena, with disparate rates of change and incommensurable units of measurement, the steps inevitably involve arguable assumptions. Prevailing economic indicators do, too. The results are informative but not definitive.

First, NEW calculated how much each indicator changes—whatever the direction—in a typical year. Northwesterners' per capita energy use, for example, rises in some years and falls in others, but the average annual change is the equivalent of four gallons of gasoline. Birthrates, meanwhile, have been quite stable since 1980: year-to-year variation in

the region's total fertility rate averages just 13 births per 1,000 women of childbearing age. (See "Sources and Methods" for this chapter at the back of the book for the typical yearly change of other indicators.) The quantity of change for any indicator is, by definition, what the Northwest is accustomed to experiencing; in fact, change at this pace is hardly noticeable without a Raven's-eye view.

Second, NEW identified a best-in-the-world level for most indicators (see Table 1). Japan's life expectancy, for example, is two and a half years longer than the Northwest's. And Germans' use of highway fuels and nonindustrial electricity is half as high as northwesterners'. Such places are not perfect, but they do exemplify goals the Northwest can hope to achieve.

With steady progress, it will take the Northwest 86 years to achieve Germany's 2001 energy efficiency

For sprawl and forests, data in the form used in the Scorecard are available only within the Northwest, so NEW could set only a best-in-the-region level. Greater Vancouver, BC, far outpaces the rest of the region's metropolises in smart growth, though it is more sprawling than Montreal, Toronto, or many European and wealthy Asian cities. The Olympic Peninsula has more of its forests in parks and wilderness than any of the other study areas; and in the late 1990s, the overall rate of clearcut logging in unprotected forests across all five study areas was at its lowest level in more than 25 years. Other forests in the world are likely managed more responsibly, but lacking comparable data for other places, the Scorecard relies on these models.

Third, NEW calculated how many years it would take for each indicator to reach the best-in-the-world (or region) level if it moved toward that goal consistently and at its own pace—the typical annual change. At an annual lifespan gain of 58 days, for example, it will take 15 years for the region to match Japan's 2001 life expectancy (see the Health line in Figure 1). In 1980, the region was 38 years from that level. Similarly, at an annual reduction in energy use of four gallons of gasoline per capita, assuming the region reduces its energy use each year, it will take 86 years to achieve Germany's 2001 energy efficiency.

Table 1. Cascadia Scorecard: World and regional models can serve as goals for the Northwest.

HEALTH

MODEL

- Japan's 2001 life expectancy of 81.3 years.

WHY CHOSEN

- Longest national lifespan in the world.

ECONOMY

MODEL

- Northern European poverty and child poverty rates for the mid-1990s, the most recent years for which comparable data are available.
- Median income of $53,000, which is the simple average of the top four US states in 2001, as a goal for the US Northwest; median income of $46,600, Ontario's figure for 2001, as a goal for British Columbia.
- Unemployment rate of 3.5 percent, an annual average achieved by a number of US states in recent years, as a goal for the US Northwest; unemployment rate of 5.4 percent, the 2002 average for Alberta, Saskatchewan, and Manitoba, as a goal for British Columbia.

WHY CHOSEN

- Northern European poverty rates are among the lowest in the world.
- Median income and unemployment rate examples illustrate recent instances in which North American economies have produced low unemployment and high incomes for middle-income families.

POPULATION

MODEL

- A total fertility rate of 1.7—the average of Sweden and the Netherlands, 2001–02.*

WHY CHOSEN

- These nations consistently rank among the best in the world for women's health, workplace equity, and political participation; they also have generous economic and workplace support for parents.

ENERGY

MODEL

- Germany's 2001 gasoline, diesel, and nonindustrial electricity consumption—the energy equivalent of 383 gallons of gas per person per year.

WHY CHOSEN

- Industrialized nation with good health and high standard of living, but comparatively low energy consumption; world leader in efficiency and deployment of renewable energy technology.

SPRAWL

MODEL

- Greater Vancouver, BC, in 2001, where 62 percent of residents lived in compact neighborhoods.

WHY CHOSEN

- Best metropolitan area for which comparable data are available. (Note: This target is less ambitious than for other trends.)

FORESTS

MODEL

- Permanent legal protection for 21 percent of forested land, as in Olympic Peninsula satellite analysis in 2002.
- Half a percent of unprotected forests cut per year, the average for the five Cascadia study areas in 1996–1999.

WHY CHOSEN

- Most protective forest practices among five Northwest study areas over the past 25 years. (Note: This target is less ambitious than for other trends.)

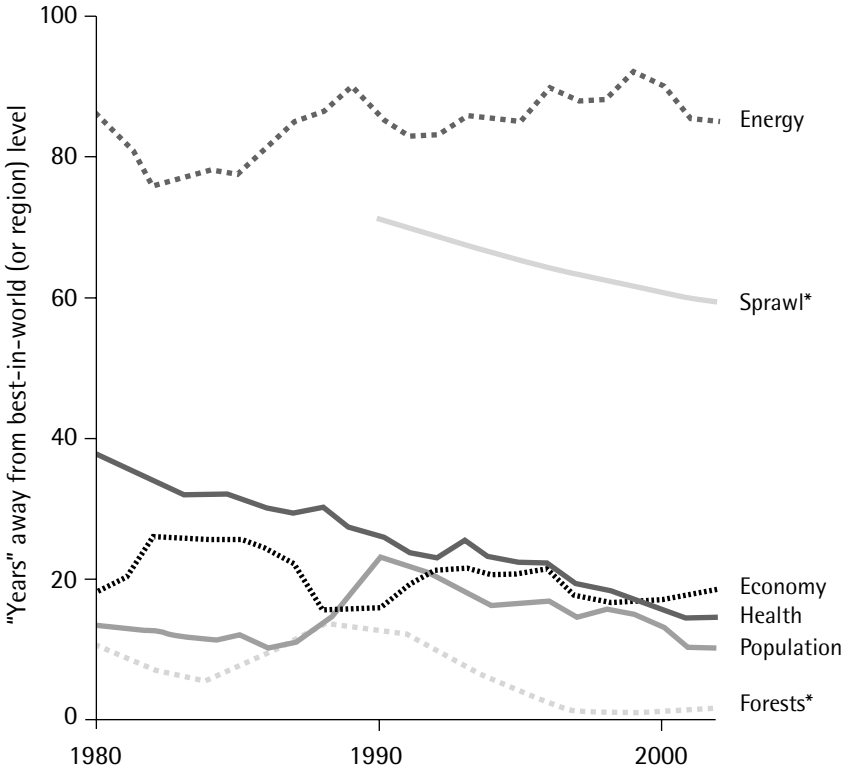
POLLUTION

Data not available at time of book's publication.

* *Average is population-weighted.*

In economic security, the Northwest is 19 years of steady progress away from the mark; for population, 11 years. In sprawl—where the benchmark is less demanding because it is locally set—the region is nonetheless 60 years from the goal. In forests, Cascadia is just 3 years from the best-in-the-region level—but this figure is less meaningful than the others: it is based on initial study areas that encompass just 14 percent of the region's forests, and the benchmark is chosen from within this preliminary sample.

These figures do not mean faster progress is not possible; it is. They also do not mean that business as usual will take the Northwest to these marks; it will not. Some of the trends are not even heading in the right



* *Based on best-in-region levels; understates years from best-in-world level.*

Figure 1. Combining the Scorecard indicators shows that the region has lagged on the energy indicator but improved on all others for which data are available. (Improvement is shown as moving down toward zero. For notes on calculations, see "Sources and Methods" for this chapter.)

direction. But the figures do give a sense of the region's strengths and weaknesses: energy (and the resource consumption it reflects) and sprawl are farthest from the mark. Northwesterners' health is gaining steadily, while their economic security is gaining unsteadily. The rates at which they are adding to their population and clearcutting their forests vary year to year, but the trajectory is improving.

Combined, the Scorecard trends show improvement (see Figure 2). In 1990, the Pacific Northwest as a whole was 41 years of slow and steady progress from the best-in-the-world mark; in 2002, it was 32 years away. British Columbia, at 9 years from target levels, has a commanding lead over the Northwest states, at 40 years. And the province's lead has actually expanded over the course of the past dozen years.

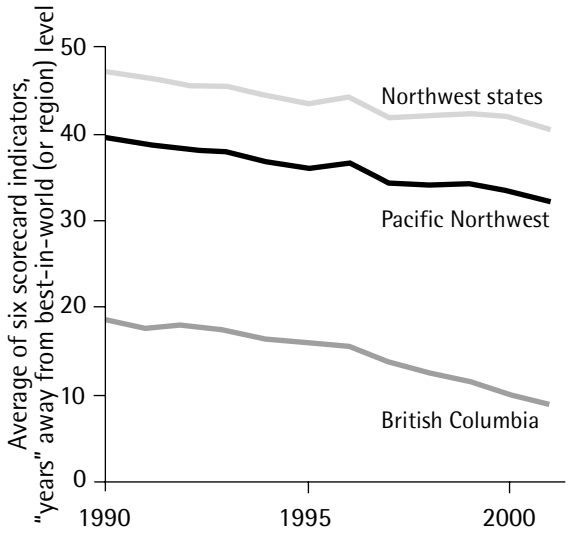


Figure 2. British Columbia outshines the Northwest states; with nine years of slow, steady progress, it could reach Cascadia Scorecard goals. (Improvement is shown as moving down toward zero.)

The good news—the improvement of most indicators—is thanks to the efforts of thousands of northwesterners. They are at work turning the trends of the Scorecard toward a future in which Cascadia leads the world, in which the Pacific Northwest achieves the elusive goal of reconciling people with place. This book cannot do justice to all their many strategies (NEW's *This Place on Earth 2001* highlights 24 of the best). But it can point out some priorities. To yield dramatic improvements in the lagging indicators of energy and sprawl, for example, will require approaches that are systemic and cross-cutting—innovations that tip the balance in millions of daily decisions across the region and that influence more than one indicator.[2]

Tax shifting is one such solution. Taxes are the DNA of the economy: invisible, cryptic, and awesomely powerful. Stealthily but effectively, they tilt investment and spending choices like nothing else.

And unfortunately, the great bulk of tax burdens in the Northwest fall on activities northwesterners want more of—such as work, entrepreneurship, and investment—penalizing and discouraging them. They bolster activities that northwesterners want less of—such as sprawl and the waste of resources.

Tax shifting—an innovation implemented in a dozen European countries—means reducing taxes on paychecks and profits and replacing the revenue, dollar for dollar, with taxes on pollution, resource consumption, sprawl, and traffic. Levies on energy, for example, can partially replace payroll taxes. Just so, taxes on parking lots and traffic congestion—through high-tech road tolls—could replace revenue from sales taxes. And point-of-purchase incentives called feebates—fees on inefficient models that pay for rebates on efficient models—could swiftly raise efficiency of energy-using appliances and vehicles. Phased in over years, tax shifts actually boost prosperity and enhance environmental and human health at once. They fund government in a way that repairs a flaw of the marketplace—the failure of prices to tell the ecological and social truth.

Rescinding outdated subsidies would further align market prices with the Scorecard's targets. Take the case of sprawl. The US federal government subsidizes sprawling development in floodplains through its flood insurance program, and in fire-prone forests through its firefighting policies. It speeds sprawl everywhere by structuring its home-ownership tax incentive—the mortgage interest deduction—to encourage the purchase of ever-larger homes and lots. State and provincial governments facilitate sprawl by extending steep property tax breaks not only to full-time farmers and foresters but also to commuters who buy hobby farms and woodlots. Property taxes in general accelerate sprawl by falling with equal weight on the value of buildings and the land under the buildings; this policy allows land speculators to prosper by holding prime urban sites off the market, deflecting development outward.

Redirecting markets—or, in some cases, creating them—also has the

potential to radically accelerate the region's progress. Local ordinances, for example, currently mandate that developers provide such a glut of off-street parking that parking is inevitably free. Of course, ample parking is free neither to home- and building owners nor to the region's environment. It ties up valuable urban space, systematically boosts sprawl, subsidizes drivers over walkers and transit riders, and creates cityscapes more geared to vehicles than to people. If the region's localities stopped dictating parking supply, parking space would diminish until markets emerged. At that point, price would begin to regulate demand—as it already does in the region's central cities.

In other cases, markets operate, but below their potential. Consumers usually have a shorter-term perspective when it comes to investing and saving money than do electric utilities, for example, with the result that it often costs consumers far less to conserve a kilowatt-hour than it costs utilities to generate one. The Northwest Energy Efficiency Alliance, a coalition of utilities and public agencies, has closed this gap in a few cases by helping to get specific energy-using devices up to critical mass in the marketplace. For example, it has subsidized manufacturers' efforts to introduce high-efficiency front-loading clothes washers. These programs, which have just begun to tap the potential of such market transformation, save dramatically more energy than could be produced for the same investment in new generating facilities.

Coming full circle, a final innovation with great promise is enhanced monitoring of the region's progress. Like Raven, what we humans watch, we change. Imagine a Northwest where every community reports monthly on a local Cascadia Scorecard—where news broadcasts follow the condition of nearby forests, the economic security of ordinary families, and the health of local citizens as assiduously as they currently cover holiday shopping at the local malls. Imagine a next-generation Scorecard that reveals the strength of community involvement, the quality of education, the accumulation and distribution of wealth, the condition of streams, the status of endangered species, the share of births that stem

Imagine a Northwest where every community reports monthly on a local Cascadia Scorecard

from planned pregnancies, the consumption of natural resources, and residents' contentment in life. Imagine how the region's future would change if, for example, northwesterners gauged their success by how little pollution was detected in mothers' milk.

The Scorecard is a way to measure progress on grounds more lasting than stock prices or consumer confidence

That the Northwest's first peoples mythologized Raven should come as no surprise: biological ravens are uncanny in their similarities to humans yet alien enough to fire the imagination. They spend their extended childhoods with their parents, form gangs as adolescents, mate for life, and socialize incessantly. They are opportunistic omnivores who thrive in diverse habitats, have long memories and longer lives, and consume voraciously. The most intelligent of birds, they are vocal, inquisitive, and observant, and their character flaw—a mean streak—is matched by generosity toward their kin. In the words of the poet Robert Bringhurst and the late Haida sculptor Bill Reid, Raven is "the essence of the clever, complex, devious, ingenious, restless . . . contradictory human race." So the trickster, with his capacity for the long view and predilection for intervening in the course of history, is actually none other than us—or certain aspects of us.[3]

The whimsical story of how Raven set the sun in the sky exemplifies these human qualities. In the darkness of mythtime, Raven stumbled upon a doorless house where an old shaman lived with his grown daughter. Hidden in the corner of the house was a set of nested boxes that held in their center all the light in the universe. To steal the light, Raven turned himself into a pine needle, floated into the daughter's drinking-water pail, and waited for her to swallow him. Inside her body, he turned into an embryonic infant. Once born as the grandson of the shaman, he used the time-honored techniques of children to win a peek at the light: he begged, whined, and threw tantrums. His grandfather finally relented, opening the boxes to show him. Raven seized the light, returned to bird form, and fled.

Then, write Bringhurst and Reid, he "flew on, rejoicing in his

wonderful new possession, admiring the effect it had on the world below, reveling in the experience of being able to see where he was going, instead of flying blind and hoping for the best." In a small way, that's the aspiration of the Cascadia Scorecard: to ensure that the Northwest no longer flies blind.[4]

The Scorecard is a way to measure progress on grounds more lasting than stock prices or consumer confidence. A Northwest that evaluated itself by reference to the Scorecard would be a place in which all children were born wanted. Those children, their bodies untainted by toxic pollutants, could expect long and healthy lives in prosperous communities. They would live amid thriving nature, enjoying a way of life that could endure through generations.

Embraced as the region's tool for gauging success—a way for humans to gain a Raven's-eye view—the Cascadia Scorecard could allow northwesterners to regenerate the Northwest as completely as Raven did after the mythical great flood: providing for the region's people, strengthening their communities, covering the hills with forests, and filling the rivers with fish.

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SOURCES, METHODS, AND ENDNOTES

THIS PLACE: CASCADIA

ENDNOTES

1. The Pacific Northwest comprises all of British Columbia, Idaho, Washington, and Oregon, along with adjoining parts of southeast Alaska, western Montana, and northern California. However, in most cases, figures reported in this book for "the Northwest" include only the province and whole states that are within its borders because data are hard to come by for substate jurisdictions. Population from US Census Bureau and Statistics Canada. Region's economy estimated from US Bureau of Economic Analysis and BC Stats.
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SLOW NEWS

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The components are aggregated using a method similar to that used to calculate the Index of Leading Economic Indicators. Each component in the index is assigned a weighting factor based on its statistical variability; wide fluctuations earn a component a lower weighting. The year-to-year changes in each component are weighted and summed, and then put on a scale in which the figure for 1990 is equal to 100. In practice, a one-point increase in the economic security index is roughly equivalent to a one-percentage-point decline in poverty, child poverty, and unemployment. For more information on methodology, see the Conference Board's technical notes on its Web site at *www.globalindicators.org/methodology* or contact NEW.

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4. ENERGY

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ELECTRICITY. In United States and states, for 1960 to 2000, from EIA State Energy Data 2000 Consumption tables (formerly the State Energy Data Reports), *www.eia.doe.gov/emeu/states/_states.html*. For 2001 to 2003, estimated from EIA's Form EIA-826 Database, "Monthly Electric Utility Sales and Revenue Data," *www.eia.doe.gov/cneaf/electricity/page/eia826.html*. In Canada and British Columbia, from Statistics Canada, "Table 128-0002: Supply and demand of primary and secondary energy in terajoules, quarterly," CanSim, *cansim2.statcan.ca*.

INTERNATIONAL DATA. Energy consumption in other countries from International Energy Agency, "Energy Balances of OECD Countries, 1999–2000," Organisation for Economic Co-operation and Development, Paris, 2002; and EarthTrends searchable database, World Resources Institute, *earthtrends.wri.org*.

ENDNOTES

1. Behavior of ravens from Feher-Elston, op. cit. note 3 in Chapter 1, "Health."
2. Gasoline prices for Northwest states from US Energy Information Administration State Energy Data System, "Petroleum Product Prices," by state, *www.eia.doe.gov/emeu/states/_states.html;* for BC from Statistics Canada, "Table 326-0009: Average retail prices for gasoline and fuel oil, by city, monthly (cents per litre)," CanSim, *cansim2.statcan.ca.* Currency conversions as of Oct. 4, 2002.
3. Gasoline consumption for Germany, Japan, and United Kingdom may include some types of gasoline not tallied in the United States, but those other countries rely far more on diesel fuel for personal transport than do U.S. residents. Still, in 1999, U.S. residents used 2.4 times as much energy per person for transportation as did residents of Germany, 2.7 times as much as residents of the United Kingdom, and 2.9 times as much as residents of Japan.
4. New generating capacity adjusted for actual electrical output from wind and natural gas generation facilities; calculated from Northwest Power Planning Council, "Power Plants in the Pacific Northwest, including Canadian hydropower projects in the Columbia River Basin," Existing Generating Projects, *www.nwcouncil.org/energy/powersupply.* Data exclude much of British Columbia's electricity.
5. Michael Lazarus et al., "Clean Electricity Options for the Pacific Northwest," Tellus Institute, Boston, Oct. 2002, at *www.nwenergy.org/outreach/docs/Tellus_PNW_Oct15.pdf.*
6. Texas wind power from Brad Heavner et al., "Energy for Washington's Economy," WashPIRG Foundation, Seattle, June 2003. Germany's wind power from Seth Dunn, *Reading the Weathervane* (Washington, DC: Worldwatch, 2002).

5. SPRAWL

SOURCES AND METHODS

POPULATION DENSITY. Urban-area population and residential density are based on population counts for city and suburban blocks, obtained from the US Census Bureau and the Census of Canada. For each location in an urban area, local population density was calculated as the density of the smallest circle that contained at least 500 residents—a rough proxy for a neighborhood.

BUILDING PERMITS. Building permit data was obtained from the Puget Sound Regional Council (PSRC) and Portland Metro, which in turn collected their data from county and city governments. Note that the permit data furnished by PSRC may show some differences from permit data published by its constituent counties.

Both the analysis of residential density and of building permit data was conducted by CommEn Space, a nonprofit organization based in Seattle that specializes in geographic and spatial data analysis.

URBAN-AREA DEFINITIONS. "Boise" and "greater Boise" refer to Ada County, Idaho, which contains the city, but exclude Canyon County, which contains the city of Nampa. "Greater Eugene" refers to Lane County, Oregon; "greater Victoria" to the Capital Regional District; "Spokane" to Spokane County; "greater Vancouver" to the Greater Vancouver Regional District; "greater Portland" to Multnomah, Washington, and Clackamas counties in Oregon, and Clark County, Washington; and "greater Seattle" to King, Snohomish, and Pierce counties. Adding in nearby counties in the same metropolitan area, such as Kitsap County to greater Seattle, Canyon County to greater Boise, and Kootenai County, Idaho, to greater Spokane would reduce the reported share of residents in each metropolis living in compact communities. For example, 4 percent of Canyon County residents lived at densities of greater than 12 people per acre in 2000, up from 1 percent in 1990; so if Canyon County were grouped with Ada County, the share of greater Boise residents living in compact communities in 2000 would be 5 percent rather than 7 percent (as listed in Figure 1). Similarly, a more restrictive definition of metropolitan areas—one that excluded rural areas on the urban fringe—might show a slightly larger share of residents living in compact communities, particularly in larger counties such as Lane County, Oregon.

DEFINITION OF "RURAL LAND" AND "COMPACT COMMUNITY," AND RELATIONSHIP BETWEEN DENSITY AND DRIVING. For this report, rural areas are defined as having an average of fewer than 1 person per acre. Likewise, compact neighborhoods are defined as those that have at least 12 people per acre—densities typical of the older "streetcar neighborhoods" that were built before World War II and that still surround downtown Portland, Seattle, and Vancouver. In some respects, these thresholds are arbitrary. Some suburban areas with large-lot zoning are classified as rural under this definition; and some neighborhoods with 12 or more people per acre have poor access to transit and services. Indeed, some researchers have suggested that local densities above 12 people per acre may be required to support transit cost-effectively. Still, the 12-person-per-acre marker provides a convenient, if not absolute, reference point for transit-oriented neighborhoods, as a robust body of international research suggests that below 8 to 12 people per acre, a city's land use patterns are inherently car dependent. See Peter Newman and Jeffrey Kenworthy, *Sustainability and Cities: Overcoming Automobile Dependence* (Washington, DC: Island Press, 1999), and Jeffrey R. Kenworthy et al., *An International Sourcebook of Automobile Dependence in Cities, 1960–1990* (Boulder: University Press of Colorado, 1999).

ENDNOTES

1. Driving from Peter Newman and Jeffrey Kenworthy, *Sustainability and Cities: Overcoming Automobile Dependence* (Washington, DC: Island Press, 1999).
2. Arthur C. Nelson and Thomas W. Sanchez, "Lassoing Urban Sprawl," *Metroscape,* winter 2003, at *www.mi.vt.edu/Files/Metroscape%20Atlas%202003-use.pdf*.
3. Job location from Greater Vancouver Regional District, "2001 Annual Report: Livable Region Strategic Plan." In the early 1990s, Vancouver's inner-city density was 41.5 people per hectare, but 128, 73.5, and 106 people per hectare were living in the inner cities of Vienna, Zurich, and Munich, respectively; see Jeffrey R. Kenworthy et al., *An International Sourcebook of Automobile Dependence in Cities, 1960-1990* (Boulder: University Press of Colorado, 1999). Vancouver's inner-city density has probably increased since then, but is still likely below the levels of the European cities.

6. FORESTS

SOURCES AND METHODS

DEFORESTATION MAPS AND CLEARCUT STATISTICS. Calculated by NEW and CommEn Space, a geographic information technology center. Data and maps based on five scenes whose boundaries are defined by scenes from NASA's Landsat satellites. For each scene CommEn Space analyzed a series of images taken from the early 1970s through 2002 and identified human-caused disturbances to forest cover of roughly 2 acres or greater. The analysis excluded natural disturbances such as avalanches or forest fires, as well as disturbances in urban areas.

In British Columbia, data for some years were estimated because satellite images were not available. Figures given for US Forest Service land do not include designated wilderness areas, which are often administered by the Forest Service. Because fewer satellite images were available for British Columbia, the analysis there covers only the period from 1976 to 2002; in some cases, this results in an understatement of clearcut logging. For details, contact NEW.

ENDNOTES

1. Effects of clearcutting from Elizabeth May, *At the Cutting Edge: The Crisis in Canada's Forests* (San Francisco: Sierra Club Books, 1998). Compared with other logging practices, clearcut logging requires the least amount of road building, and roads are a primary cause of erosion. Nevertheless, clearcuts themselves, especially on slopes, can be the source of more serious erosion than other forms of timber harvesting. Greenhouse gas emissions from Ryan, op. cit. note 18 in "Slow News" chapter.

2. The study areas, while informative in themselves, are not necessarily representative samples of the Northwest's forests. Indeed, no study area could be. Clearcut logging is by no means confined to these five parcels, nor can we deduce much about the rate of clearcutting elsewhere based on the pace of deforestation in the study areas.
3. Endemic plants and animals from Olympic National Park's Web site, "Discover Olympic: Island Olympic," *www.nps.gov/olym/students.htm.*
4. Wolverine and cutthroat trout from Oregon Natural Resources Council, "Diamond Lake Ranger District Roadless Areas, Umpqua National Forest," *www.oregonwild.org/diamond.html.*
5. The ecological implications of large clearcuts are inconclusive. A large clearcut has relatively less edge, and clearcut edges tend to adversely affect the ecology of the nearby unlogged forest. Mountain caribou from Brian Payton, "Showdown at the Summit," *Canadian Geographic,* May/June 2003.
6. Mountain pine beetle and its impacts from various sources in BC Ministry of Forests, "Bark Beetles in British Columbia," *www.for.gov.bc.ca/hfp/pubs/interest/mpbecon.* Salvage logging from same entry and BC Ministry of Forests, "Timber Supply and Mountain Pine Beetle Infestation in British Columbia," Oct. 2003, at *www.for.gov.bc.ca/hts/pubs/beetledoc_oct29LO.pdf.*
7. Logging in provincial parks from Mark Hume, "Premier Hints at Logging B.C. Parks," *Globe and Mail,* Sept. 30, 2003. Development threats from Hal Salwasser, Oregon State University, College of Forestry, private communication, Oct. 13, 2003; and Peter Goldman, Washington Forest Law Center, private communication, Oct. 23, 2003.

7. POLLUTION

SOURCES AND METHODS

BREAST MILK TESTING. Breast milk from 40 first-time Northwest mothers with infants between two and eight weeks of age was collected from April through November 2003. Ten mothers were recruited from each of four metropolitan areas: Seattle, Portland, Vancouver, BC, and Missoula, Montana. These samples were tested for the presence of dioxins and dioxin-like compounds (including furans and coplanar PCBs), as well as a suite of non-coplanar PCBs and the six most widely produced varieties of PBDE. All tests were performed by the California Environmental Protection Agency's Hazardous Materials Laboratory in Berkeley, California, using gas chromotography/high-resolution mass spectrometry.

ENDNOTES

1. Composition of human bodies from Ward and Brownlee, op. cit. note 1 in Chapter 1, "Health." Water content of the human body from "What Percentage of the Human Body Is Water, and How Is This Determined?" Boston Globe, n.d., *www.boston.com/globe/search/stories/health/how_and_why/011298.htm.*
2. Chemicals in human bodies from Jane Houlihan et al., "Body Burden: The Pollution in People," Environmental Working Group, Washington, DC, January 2003, at *www.ewg.org/reports/bodyburden;* Centers for Disease Control and Prevention (CDC), *Second National Report on Human Exposure to Environmental Chemicals* (Atlanta: National Center for Environmental Health, 2003), at *www.cdc.gov/exposurereport;* and Colburn, Dumanoski, and Myers, op. cit. note 20 in "Slow News" chapter.
3. Declines in body burdens after regulatory action from Gina Solomon and Pilar Weiss, "Chemical Contaminants in Breast Milk: Time Trends and Regional Variability," *Environmental Health Perspectives* 110(6):339–47 (2002). Declines in DDT from, e.g., A. G. Craan and D. A. Haines, "Twenty-five Years of Surveillance of Contaminants in Human Breast Milk," *Archives of Environmental Contamination and Toxicology,* 1998; CDC, op. cit. note 2; Environment Canada, "Toxins in Great Blue Heron Eggs: An Indicator of Contaminants in the Georgia Basin," at *www.ecoinfo.ec.gc.ca/env_ind/region/gbhtoxin/gbhtoxin_e.cfm;* and Natural Resources Defense Council, "Healthy Milk, Healthy Baby: Chemical Pollution and Mother's Milk," at *www.nrdc.org/breastmilk/chem2.asp*. Thriving bald eagles, and links to ban of DDT, from Derek W. Stinson, James W. Watson, and Kelly R. McAllister, "Washington State Status Report for the Bald Eagle," Washington Dept. of Fish and Wildlife, Oct. 2001, at *www.wdfw.wa.gov/wlm/diversty/soc/status/baldeagle;* and U.S. Fish and Wildlife Service, "News Release: The Bald Eagle Is Back," at *www.fws.gov/r9extaff/eaglejuly2.html.* Decline in children's blood lead levels from CDC, "Children's Blood Lead Levels in the United States," at *www.cdc.gov/nceh/lead/research/kidsBLL.htm.*
4. Breast milk as proxy for community body burdens from Kim Hooper and Jianwen She, "Lessons from the Polybrominated Diphenyl Ethers (PBDEs): Precautionary Principle, Primary Prevention, and the Value of Community-Based Body-Burden Monitoring Using Breast Milk," *Environmental Health Perspectives* 111(1):109–14 (2003). Correlation between contamination in breast milk and in cord blood from Daiva M. Guvenius et al., "Human Prenatal and Postnatal Exposure to Polybrominated Diphenyl Ethers, Polychlorinated Biphenyls, Polychlorobiphenylols, and Pentachlorophenol," *Environmental Health Perspectives,* 111(9):1235–41 (2003).
5. Benefits of breastfeeding from, e.g., Greater Boston Physicians for Social Responsibility, "What About Breastfeeding," *psr.igc.org/breastfeeding.htm.*

6. Relative importance of fetal and postnatal exposure from, e.g., Susan L. Schantz, John J. Widholm, and Deborah C. Rice, "Effects of PCB Exposure on Neuropsychological Function in Children," *Environmental Health Perspectives* 111(3):357–76 (2003); and M. Huisman et al., "Neurological Condition in 18-month-old Children Prenatally Exposed to Polychlorinated Biphenyls and Dioxins," *Early Human Development* 43(2):165–76 (2003). Longest-term study of PCB exposure from Joseph L. Jacobson and Sandra W. Jacobson, "Association of Prenatal Exposure to an Environmental Contaminant with Intellectual Function in Childhood," *Clinical Toxicology,* 40(4):467–75 (2002).
7. Orcas as most contaminated marine mammals on the planet from P. S. Ross et al., "High PCB Concentration in Free-Ranging Pacific Killer Whales, *Orcinus Orca:* Effects of Age, Sex, and Dietary Preference," *Marine Pollution Bulletin* 40(6):504–15 (2000). PCB contamination in female orca from "Dead Orca Is a 'Red Alert,'" *Seattle Post-Intelligencer,* May 7, 2002. PCBs in Puget Sound sediments from Michael Schmidt and Pam Johnson, "Toxics in the Puget Sound Food Web," People for Puget Sound, Seattle, Dec. 2001, at *www.pugetsound.org/toxicfoodweb/toxic_food_web.pdf*.
8. Health effects of dioxin from Sandra Steingraber, *Having Faith: An Ecologist's Journey to Motherhood* (Cambridge, Mass.: Perseus Publishing, 2001). Recommendation for curtailing dietary fat from the National Academies, "News: Report Recommends Steps to Reduce Dietary Dioxin Exposure," July 1, 2003, at *www4.nas.edu/news.nsf/isbn/0309089611*. Dioxin sources from Bill Yake, Stacie Singleton, and Karol Erickson, *Washington State Dioxin Source Assessment* (Olympia, Wash.: Washington Dept. of Ecology, 1998), at *www.ecy.wa.gov/biblio/98320.html*.
9. PBDEs as share of polyurethane foam cushion from Kim Hooper and Thomas McDonald, "The PBDEs: An Emerging Environmental Challenge and Another Reason for Breast-Milk Monitoring Programs," *Environmental Health Perspectives* 108(5):387–92 (2000). Effects of PBDEs on laboratory animals from Thomas McDonald, "A Perspective on the Potential Health Risks of PBDEs," *Chemosphere* 46:745–55 (2003).
10. Increases in Swedish PBDE levels from K. Noren and D. Meironyte, "Certain Organochlorine and Organobromine Contaminants in Swedish Human Milk in Perspective of Past 20–30 Years," *Chemosphere* 40:1111–23 (2000). PBDE levels in the United States from Sonya Lunder and Renee Sharp, "Mother's Milk: Record Levels of Toxic Flame Retardants Found in American Mothers' Breast Milk," Environmental Working Group, Washington, DC, Sept. 2003, at *www.ewg.org/reports/mothersmilk/;* and Arnold Schecter et al., "Polybrominated Diphenyl Ethers (PBDEs) in U.S. Mothers' Milk," *Environmental Health Perspectives* 111(14):1723–29 (2003). Increases in PBDE levels in Vancouver milk samples from John Jake Ryan et al., "Recent Trends in Levels of Brominated

Diphenyl Ethers (BDEs) in Human Milks from Canada," *Organohalogen Compounds* 58:173–76 (2002). Relative levels of PBDEs and PCBs from Hooper and McDonald, op. cit. note 9.

FLYING BLIND

SOURCES AND METHODS

MODEL PERFORMANCE AND TYPICAL YEARLY CHANGE. For the purpose of aggregating scores for Scorecard indicators, "model" performance is held constant over time, and typically represents the best performance during a single year or range of years in some part of the world. For example, Japan's 2001 life expectancy of 81.3 years is held as the model for Northwest health in all years from 1980 to the present. Typical yearly change is defined as the average of the annual change (increase or decrease) over each five-year period between 1980 and 2002 for which data are available. See Table 1 for the values of typical yearly change for each indicator. Averaging change

Table 1. Cascadia Scorecard: Typical yearly change in key indicators

Indicator	Measure	Typical yearly change, 1980 to most recent year*
Health	Life expectancy at birth	58 days
Economy	Points on the Scorecard's economic security index (see "Sources and Methods: Economy")	0.5 points
Population	Total fertility rate	13 births per 1,000 women of childbearing age
Energy	Per capita consumption of highway fuels and nonindustrial electricity	Equivalent of 4 gallons of gasoline per person per year
Sprawl	Percent of metro residents living in compact neighborhoods	0.5 percent
Forests	Share of forestland clearcut	0.05 percent of unprotected forestland per year
Pollution	Data not available at time of book's publication.	

**Absolute value of average annual change*

over five years reduces the influence of apparent variations that are actually due to measurement error, weather, and other temporary fluctuations, rather than to changes in the underlying trends themselves. For the economic security indicator, poverty and median income data are not directly comparable between Canada and the United States, so typical annual change and "model" performance are defined differently for British Columbia and for the Northwest states. For sprawl, average annual change in the share of residents in compact neighborhoods was estimated from the US census data for 1990 and 2000 and Canadian census data for 1991, 1996, and 2001. Because satellite images were not analyzed for every year, clearcutting data are based on five-year rolling averages of clearcut acreage. Pollution data are excluded for lack of time-series data.

AGGREGATING TRENDS FOR THE NORTHWEST. In calculating a Scorecard value for BC vs. the Northwest states, typical yearly change for the entire region was used for estimating typical change in subregions. British Columbia's birthrates were below the "target" levels for most years since 1980; for these years, the "years to target" value was assumed to be negative—indicating better performance than the chosen model. The economic security score for the Northwest as a whole is a population-weighted average of BC and the Northwest states.

ENDNOTES

1. Pace of clearcutting conservatively estimated from "Sources and Methods" for Chapter 6, "Forests." The average annual clearcut logging rate for 2000 to 2002 for the five study areas is roughly equivalent to one acre per three minutes. The five study areas constitute just 14 percent of the Northwest's forests and exclude many heavily logged areas. Pace of sprawl estimated from sources in "Sources and Methods" for Chapter 5, "Sprawl," and sources in "Pavement" in *This Place on Earth 2002* (Seattle: NEW, 2002), at *www.northwestwatch.org/publications/tpoe02.asp*.
2. Also see Alan Thein Durning and Yoram Bauman, *Tax Shift* (Seattle: NEW, 1998), at *www.northwestwatch.org/publications/tax.asp*.
3. Characteristics of ravens from Feher-Elston, op. cit. note 3 in Chapter 1, "Health." Characteristics of Raven from Reid and Bringhurst, op cit. note 24 in "Slow News" chapter.
4. Reid and Bringhurst, op. cit. note 24 in "Slow News" chapter.