Region at risk: Visualizing environmental trends in the American West

EcoWest.org

Executive Summary

April 2013
Inform and advance conservation in the North American West by analyzing, visualizing, and sharing data on environmental trends.
EcoWest decks describe trends in key metrics

This is a summary of six presentations that illustrate key environmental metrics.

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Download presentations and other resources at ecowest.org
Key points

1. **Human footprint**: Despite the prevalence of public land, many of the West’s iconic and least disturbed landscapes are vulnerable to human activities, putting biodiversity and wilderness values at risk.

2. **Land use**: Population growth is a key driver, but agriculture uses most of the West’s water and has a bigger footprint than cities and suburbs.

3. **Water**: Growth and climate change are compounding the water crisis by increasing demands and jeopardizing supplies, but water quality is generally better out West than back East.

4. **Biodiversity**: Habitat loss, invasive species, and climate change are the top threats to the West’s rich array of species and ecosystems.

5. **Wildfires**: Climate change and the legacy of fire suppression will continue to make the wildfire season longer, costlier, and more destructive.

6. **Public opinion**: Americans—and Westerners in particular—often support environmentalists’ goals, but hostility toward the movement may be growing.

7. **Funding**: Budgets for federal environmental agencies are relatively steady and ballot measures usually pass, but considerably fewer have been put to voters during the economic downturn.
# Overview of trends in key issues

<table>
<thead>
<tr>
<th>Issue</th>
<th>Status</th>
<th>Good news</th>
<th>Bad news</th>
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| Land use   | • The West still has large tracts of wilderness and native habitat that are relatively undisturbed  
             • Some extractive industries, such as public lands logging, pose less of a threat today  
             • Land trusts are growing in number and protecting more acres of open space  | • Growth is expanding the human footprint around cities and spreading impacts to previously unpopulated places  
             • Even remote public lands are crisscrossed by roads and suffering from invasive species  
             • Many public lands are vulnerable to harmful development under multiple-use doctrine |
| Water      | • Newer power plants are using less water  
             • Utilities are employing progressive rate structures to encourage conservation  
             • The Clean Water Act has reduced pollution in many waterways  
             • Water quality in the West is generally better than in the East  | • Demand exceeds supply in overallocated river basins, creating conflicts over water  
             • Overpumping is depleting many aquifers and harming nearby streams/rivers  
             • Climate change expected to shrink snowpack and change the timing of peak flows  
             • Nation’s water infrastructure is crumbling |
| Wildfires  | • Some overgrown forests are being treated with judicious fuels reduction and prescribed burns  
             • Land managers are letting some wilderness fires burn to restore the natural cycle  
             • Many communities are adopting fire-wise building practices and mitigating risks  | • In many areas, wildfires are growing larger, burning longer, becoming more intense, and costing more to suppress  
             • More homes are vulnerable in the wildland-fire interface and the fire threat may prompt harmful mechanical treatments  
             • Climate change is exacerbating the problem |
| Biodiversity | • Overexploitation (hunting and collecting) is less of a problem today  
                     • Key game species, such as deer, elk, and pronghorn, have made dramatic recoveries  
                     • Some endangered species have been pulled back from the brink of extinction  
                     • The backlog of candidates for Endangered Species Act protection is decreasing  | • Climate change posing an existential threat to some species and compounding traditional problems, such as habitat loss and invasives  
             • Freshwater species doing especially poorly  
             • The conservation status for many species is unknown and not monitored |
### Overview of trends in key issues

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| Energy         |        | * Wind, solar, and other renewables are making gains, with many Western states adopting renewable portfolio standards  
* Some technologies, including vehicles, are becoming more efficient                                                                 | * Fossil fuels continue to dominate the energy sector and dwarf renewables  
* Many wilderness-quality lands are threatened by energy development, including renewables                                                                                                           |
| Air quality    | *     | * Levels of carbon monoxide, sulfur dioxide, and nitrogen dioxide have declined, despite a growing economy, increasing energy use, and rising vehicle-miles traveled  
* Shift from coal to natural gas is decreasing local air pollution from power generation                                                                                                 | * Particulates and ozone more difficult to control  
* Poor air quality is a chronic problem in some places, and millions of Westerners are still exposed to toxic air pollution  
* Dust-on-snow events are leading to accelerated melting of snowpack                                                                                                                   |
| Climate change | *     | * Heightened awareness among public and policymakers of the impacts in West  
* Some Western states taking the lead in mitigation and adaptation                                                                                                                                      | * Much of West expected to get drier and be subject to more extreme weather/wildfires  
* Lack of political will to enact policies to reduce greenhouse gas emissions  
* Species already on the move, but habitat loss and fragmentation pose obstacles                                                                                                        |
| Public opinion | *     | * Great majority of Americans are concerned about the quality of the environment  
* Strong public support for open space, clean air, clean water, and other conservation goals  
* Many Westerners reject false choice of “jobs vs. the environment”                                                                                                                        | * Environment barely registers on national agenda of top problems  
* Recession has slightly weakened support for environmental protection  
* Signs of increasing hostility toward the environmental movement                                                                                                                            |
| Funding        |        | * Budgets of federal environmental agencies have remained fairly steady over past decade  
* Conservation ballot measures usually pass at the polls                                                                                                                                             | * Sequester and fiscal austerity exerting downward pressure on public spending  
* Fewer conservation ballot measure have been put to voters during recession                                                                                                                        |
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LAND USE

Land Use  Energy  Water  Biodiversity  Wildfires  Climate Change  Public Opinion  Funding
Key points: land use

- Although much of the West is publicly owned, the human footprint is evident almost everywhere in the region.
- Relatively pristine areas are often protected as wilderness or national parks, but many of the least developed areas remain vulnerable due to the multiple-use doctrine.
- The West accounts for a rising share of the nation’s population, with most growth occurring in and around big cities in an increasingly urbanized region.
- Some traditional economic sectors, such as logging on public lands, are in decline, but the West is still home to important mines, farms, and energy development.
Federal lands common in Western states

BLM is biggest landowner, followed by Forest Service

Portion of each state that is federal land

Source: U.S. General Services Administration
Much of the West is nominally protected

But multiple-use doctrine applies to most BLM, Forest Service land

Source: The Nature Conservancy
Humanity’s imprint is already deep, indelible

*Agriculture has largest footprint, often in unpopulated regions*

Source: U.S. Geological Survey
Some of least disturbed areas still vulnerable

Many of these areas are not a wilderness or national park

Source: U.S. Geological Survey
The West has many of the nation’s growth hotspots

California, Southwest, and Washington among biggest gainers

Numeric change in population by county: 2000-2010

- Source: U.S. Census Bureau

<table>
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<th>Numeric change in population by county: 2000-2010 (thousands)</th>
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<tr>
<td>40+</td>
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<tr>
<td>20 to 39</td>
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<tr>
<td>10 to 19</td>
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<tr>
<td>0 to 9 (thousands)</td>
</tr>
<tr>
<td>-1 to -9</td>
</tr>
<tr>
<td>Less than -9</td>
</tr>
<tr>
<td>Comparable data not available</td>
</tr>
</tbody>
</table>
The West’s population is highly concentrated
Region known for unpopulated expanses is actually very urbanized

Population by county: 2010

Source: U.S. Census Bureau, 2010 Census
In 1940, the West was still pretty lonely territory

Housing density especially low in inland states

United States
1940 Housing density
Census partial block groups

Housing units / km²

- 0
- 0 - 2
- 2 - 4
- 4 - 8
- 8 - 16
- 16 - 128
- > 128
- Water
By 2000, the region’s population had skyrocketed

Not only along West Coast, but also inland
It’s expected to be even more crowded by 2030

But much of NV, UT, WY, MT are still unpopulated
Some traditional extractive industries in decline

*Logging in national forests a shadow of its former self*

Timber produced by U.S. national forests

- **Sold**
- **Harvested**

Source: U.S. Forest Service

Northern spotted owl
ESA listing

Billions of board-feet

Source: EcoWest.org
Much of the West still home to livestock

*Cattle found in some very hot, dry areas*

![Map showing pasture/range and cattle distribution](image-url)

**Pasture/Range**
Percent of county
- 0.0 - 11.7
- 11.8 - 27.5
- 27.6 - 47.0
- 47.1 - 70.4
- 70.5 +

**Cattle**
1 dot = 10,000 cattle

Source: U.S. Global Change Research Program
ENERGY

Land Use  Energy  Water  Biodiversity  Wildfires  Climate Change  Public Opinion  Funding
Key points: energy

• The West has become an important player in the nation’s fossil and renewable energy supply
• New technologies are leading to the development of shale gas deposits in the West, but the growth rate is expected to be even greater in the East
• Although the use of fossil fuels still dwarfs renewable supplies, the West is home to important sites for solar and wind energy that are seeing increasing development
• All forms of energy development, including renewables, cause environmental impacts, but efficiency measures, can reduce the physical footprint of the energy sector
Federal lands important for fossil fuel production

Private, tribal, and state land also home to energy development

Source: U.S. Energy Information Administration
Fossil fuel sales fairly steady on public/tribal lands

Government regulations and market forces influence drilling activity

Sales of fossil fuels produced on federal and Indian lands, 2003-2011

Source: U.S. Energy Information Administration
Natural gas displacing coal as wind power increases

Renewables now account for much of the new generating capacity

Additions to U.S. electricity generating capacity

- Other/Renewables
- Natural Gas/Oil
- Nuclear
- Hydropower
- Coal

Source: U.S. Energy Information Administration
Natural gas least expensive, wind getting close

Large-scale solar plants are the most costly

Cost of new generation in 2017

Source: U.S. Energy Information Administration
Shale gas found throughout the country

Often in the same locations as conventional gas plays

Source: U.S. Energy Information Administration
Hydro, wood, and biofuels are top renewables

Wind power production rising steeply in recent years

Renewable Energy: Total Consumption and Energy Sources, 1949-2010

Source: U.S. Energy Information Administration
Wind, solar, and biomass projected to increase

But at this rate, they’ll still be a small fraction of nation’s portfolio

Projected growth in non-hydro renewable energy

Source: U.S. Energy Information Administration
Wind power has been deployed throughout the nation. Except in the Southeast states, where the potential is poor.

Where wind project density is high, project location is not precise in order to show multiple projects in a small geographic area. Project location is based on county.
Sage grouse range overlaps some wind power sites

*ESA candidate threatened by habitat loss and fragmentation*
Some Western states in top 10 for solar capacity

Utility projects larger than residential or commercial installations

MW of PV installed during 2012

- California: 1,032.7 MW
- Arizona: 710.3 MW
- New Jersey: 414.9 MW
- Nevada: 198.0 MW
- North Carolina: 131.9 MW
- Massachusetts: 128.9 MW
- Hawaii: 108.7 MW
- Maryland: 74.3 MW
- Texas: 64.1 MW
- New York: 60.5 MW

Capacity installed (MW_{dc})
- Residential: Total = 488 MW
- Commercial: Total = 1,043 MW
- Utility: Total = 1,782 MW

Source: Solar Energy Industries Association
Desert tortoises live in some solar power hotspots

Good solar potential extends beyond the desert Southwest

Critical habitat for desert tortoise (Mojave subspecies)

Source: National Renewable Energy Laboratory, Bureau of Land Management
Biofuels have the biggest footprint, efficiency shrinks impact. Solar and wind farms can contribute to "energy sprawl."
Key points: water

- A limited, unpredictable water supply is a defining feature of the West, which faces a water crisis that is being compounded by growth and climate change.
- Overall, we’re becoming more efficient in our water use, but municipal demand continues to rise along with the region’s growing population.
- Irrigation and energy continue to dominate the West’s water use, accounting for nearly 90 percent of withdrawals.
- Although water quality has generally improved, our water infrastructure is crumbling and the repair bill is contributing to increasing water costs.
- Water conservation is less expensive than acquiring new supplies while desalination is both costly and energy intensive.
Inherent challenge: aridity west of 100\textsuperscript{th} Meridian

The Pacific Northwest and highest mountains are exceptions

Average annual precipitation: 1951-2002 (inches)

Source: Climate Wizard
Western streams top the water quality rankings

Nearly half rated in good condition

Biological condition of streams

- **West**: 45.1% Good, 25.8% Fair, 27.4% Poor
- **Plains and Lowlands**: 29.0% Good, 29.0% Fair, 40.0% Poor
- **Eastern Highlands**: 18.2% Good, 20.5% Fair, 51.8% Poor

Source: U.S. Environmental Protection Agency
Withdrawals are leveling even as population grows

More efficient power plants require much less water

Source: U.S. Geological Survey
Withdrawals dominated by power and irrigation

You need energy to deliver clean water, and water to run power plants

U.S. water withdrawals (billions of gallons/day)

Source: U.S. Geological Survey
Irrigation is the top water user in the West

That’s been true for decades, but cities are consuming a rising share

Water withdrawals in the West, 2005

- Irrigation: 76.2%
- Public Supply: 10.8%
- Thermoelectric: 11.8%
- Mining: 0.3%
- Livestock: 0.2%
- Domestic, Self-Supplied: 0.8%
- Industrial Self-Supplied: 0.1%

Source: U.S. Geological Survey
Calif., Southwest, and High Plains face water stress

Growing demands and questionable supplies

Source: The Nature Conservancy
Climate change, growth to heighten water conflicts

Clash between population trends and needs of endangered species

Potential water supply conflicts by 2025

Water Supply Issue Areas
- Unmet rural water needs
- Conflict potential - moderate
- Conflict potential - substantial
- Conflict potential - highly likely
- Indian lands and Native entities

Source: Bureau of Reclamation, U.S. Global Change Research Program
Crumbling water works will cost billions to fix

One reason why the price of water is rising

Estimated investment need 2010 - 2015

- Roads and Bridges
- Transit
- Drinking Water and Wastewater
- Schools
- Aviation
- Public Parks and Recreation
- Inland Waterways
- Rail
- Energy
- Levees
- Dams

Source: American Society of Civil Engineers

Billions

- Estimated Actual Spending
- American Recovery and Reinvestment Act
- 5-Year Investment Shortfall

Source: EcoWest.org
Consumer water bills continue to climb

Many utilities in West searching for new supplies

Average change in residential utility costs: 2000-2012

Current dollars

Inflation adjusted

Water

Heating oil

Electricity

Natural gas

Water bills increased faster than natural gas or electricity costs for American consumers between 2000-2012

Source: USA Today
Strategies for saving water in agriculture

Biggest user has major conservation potential

Potential savings compared to fallowing and land retirement

Water savings (million acre-feet per year)

- Modest crop shifting
- Smart irrigation scheduling
- Advanced irrigation management
- Efficient Irrigation technology
- Fallowing
- Land retirement

Source: Pacific Institute
Nearly 60% of water use occurs outside the home

Drought-tolerant landscaping can dramatically reduce water use

Source: American Water Works Association
Water markets are already functioning in West

Agriculture is top source of water transfers

Volume of water transfers in the West

- Sales
- Long-Term Leases
- Short-Term Leases

Source: Brewer et al. (2007)
Desalination is very energy intensive—and costly

Greenhouse gas footprint looms large in California

Energy intensity of water sources in San Diego County

- Seawater desalination
- San Francisco Bay Delta
- Imperial Irrigation District
- Colorado River
- Water bags
- Local groundwater
- Recycling
- Local surface water

Energy intensity, kWh/af

Source: Pacific Institute
BIODIVERSITY
Key points: biodiversity

- Ecosystem and species diversity is one of the hallmarks of the West and is due to the region’s extremes in elevation, wide variation in climate, and unique assemblage of ecological communities.
- The number of imperiled species continues to rise, but the process of granting plants and animals Endangered Species Act protection is highly politicized.
- Habitat loss, invasive species, and climate change are among the greatest threats, but overhunting and illegal collecting are less of a problem today.
The West’s terrestrial ecoregions: A mosaic of diversity

Source: The Nature Conservancy
Dry parts of the West are among the most diverse. Extremes of topography and climate contribute to biological richness.
Threatened: how the IUCN classifies U.S. species

Just a fraction of plants and animals have been assessed

Total Species: >200,000

Evaluated: 4,926

Adequate Data

Threatened:
- Extinct (EX): 258
- Extinct in the Wild (EW): 11
- Critically Endangered (CR): 297
- Endangered (EN): 281
- Vulnerable (VU): 579
- Near Threatened (NT): 336
- Least Concern (LC): 472

Data Deficient (DD): 2,692

Not Evaluated (NE): 54

Source: IUCN

EcoWest.org
About 30% of U.S. species are vulnerable or worse

Animals doing slightly better than plants

Source: Precious Heritage: The Status of Biodiversity in the United States
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<th>Species</th>
<th>Where found?</th>
<th>Conflicts and public policy issues</th>
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<td>Gray wolf</td>
<td>Northern Rockies and Southwest</td>
<td>Opposition from ranchers and others animates debate over delisting of Northern Rockies population; Southwest wolves doing poorly.</td>
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<tr>
<td>Salmon</td>
<td>Pacific Coast and Pacific Northwest</td>
<td>Major impacts on dam operations, but also affected by land-use changes, such as logging of headwaters habitat.</td>
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<td>Spotted owl</td>
<td>Pacific Coast states (northern) and Southwest (Mexican)</td>
<td>Need old-growth forests and have contributed to significant declines in logging in the Pacific Northwest.</td>
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<td>Desert tortoise</td>
<td>Mojave Desert of Southern California and Nevada</td>
<td>Once threatened to derail growth in Las Vegas; now coming into conflict with solar energy proposals.</td>
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<tr>
<td>Delta smelt</td>
<td>Sacramento-San Joaquin Delta</td>
<td>Continuing to influence management of the hub in California’s water works.</td>
</tr>
<tr>
<td>Canada lynx</td>
<td>Rocky Mountains</td>
<td>Impacts ski industry and other development in high-elevation areas.</td>
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Number of endangered species continues to rise

*Listings are supposed to be science-based and ignore economic impacts*

Number of species protected by the ESA

Source: U.S. Fish and Wildlife Service
Listings influenced by who’s in the White House

*George W. Bush administration kept a lid on listings*

Average number of species listed per year

Source: U.S. Fish and Wildlife Service
Waiting to board the ark: a backlog of candidates

Obama administration has shortened the queue

Number of candidates for ESA protection

Source: U.S. Fish and Wildlife Service
Endangered species clustered in subset of counties

Southwest and California are hotspots in West

Source: Precious Heritage: The Status of Biodiversity in the United States
Habitat loss and alien species jeopardizing species

1998 analysis didn’t address the impact of climate change

Major threats to imperiled or listed U.S. species

- Habitat loss/degradation
- Alien species
- Pollution
- Overexploitation
- Disease

Source: Wilcove et al. (1998)
Agriculture top driver of habitat loss/degradation

Unnatural fire regimes even greater threat than development

Top habitat threats for U.S. endangered species

Source: Precious Heritage: The Status of Biodiversity in the United States
WILDFIRES
Key points

- Fire is essential to maintaining ecosystem health in many Western forests, woodlands, and grasslands, but decades of fire suppression have caused an unnatural build-up of fuels in some areas.
- Fire activity varies year to year, largely due to the weather, but blazes are generally getting bigger, burning longer, doing more damage, and costing more to suppress.
- An increasing number of acres are being treated with mechanical thinning and prescribed burns, but the backlog is tremendous and there is some disagreement about where to focus the work.
Much of the West is susceptible to wildfires

But natural fire regime varies dramatically in different habitats

Fire potential

- Very low
- Low
- Moderate
- High
- Very high
- Non-vegetation
- Agriculture
- Urban/Development/Ag
- Water

Source: USDA Forest Service/Fire Science Laboratory, Rocky Mountain Research Station
Many Western forests filled with more fuel

_In drier forests, frequent, low-intensity fires are often natural_

Source: US Forest Service
Most areas have degraded natural fire regimes

In West, only Pacific NW and Northern/Central Rockies are “intact”
Acres burned varies by year, but overall trend is up.

Weather plays key role in severity of fire season.

Acres burned by U.S. wildfires: 1961-2012

Source: National Interagency Fire Center
Average size of fires has also increased

*Prior to 1990, number of fires was reported differently*

Average acreage of U.S. wildfires: 1990-2012

Source: National Interagency Fire Center
Fires consume biggest share of Forest Service budget

Agency often taps supplemental emergency funds

Source: U.S. Forest Service

EcoWest.org
Many busy fire seasons over the past decade

But some seasons are quiet due to benign weather

Days at Preparedness Levels 4 and 5

Source: National Interagency Fire Center
Fuels reduction increasing on federal lands

Compared to the overall need, it’s a drop in the bucket

Fuels treatment on federal lands and the wildland-urban interface (WUI)

Source: Departments of Agriculture and Interior

EcoWest.org
Fight fire with fire: prescribed burns

Much cheaper than mechanical thinning, but always a risk of escape

Source: National Interagency Fire Center
More homes in wildland-urban interface

Population growing in fire-prone lands

Source: U.S. Forest Service
Key points

• **Temperature**
  – The West is already warming faster than many parts of the country and even higher temperatures are expected in the decades to come

• **Precipitation**
  – Models predict the Southwest will get drier and the Pacific Northwest will get wetter, but the projections elsewhere are more ambiguous

• **Water impacts**
  – Changes to the vital winter snowpack and the timing of the spring snowmelt will pose challenges to aquatic species and water managers

• **Biodiversity impacts**
  – Plants and animals are expected to move upslope and toward the North Pole but many barriers stand in the way

• **Wildfire impacts**
  – Warmer temperatures and a thinner snowpack will continue to make the West’s wildfire season longer and more destructive
In West, warming will be greatest in interior

Models point to much hotter weather across country

Projected temperature change by 2080s: High emissions (A2) scenario
Southwest will get drier, Northwest will get wetter

Precipitation projections more ambiguous than temperature predictions

Projected precipitation change by 2080s: High emissions (A2) scenario

Average precipitation change (millimeters)

High : 16.6969
Low : -16.4928

Source: Climate Wizard
Spring and summer will be drier in much of West

Seasonal precipitation patterns critical for wildlife, water managers

Projected precipitation changes: 2080-2099

Winter

Spring

Summer

Fall

Source: U.S. Global Change Research Program
Major precipitation changes by 2020s and 2030s
The new normal: U.S. climate may be far different in just a decade or two

Changes in Precipitation 2020-2039 from 1961-1990

Source: Tetra Tech, Natural Resources Defense Council
Climate change effects on water cycle

Less snowfall, more extreme storms, higher evaporation

Hotter/Drier Conditions (Interior West)

Hotter/Wetter Conditions (NE and Coasts)

Heat Trapped by the Atmosphere Causes more Evaporation and More Precipitation

Decreases in Snowfall Due to Warming Lead to Proportional Increases in Rainfall

Decreased Snowpack and Glaciers

Earlier Peak Streamflow

Past Extent of Snowpack and Glaciers

More Severe Droughts Between Rains

Increase in Rainfall From Heavy Precipitation Events Leads to Increased Flooding and Sediments

Decrease in Rainfall

Decrease in Light Rains

Decrease in Lake Ice

Increased Potential Evaporation and Water Temperature

Decrease in Late-Summer Water Flow with Increased Water Temperature

Increase in Water Temperature Over Time

Increase in Sediment and Runoff

Increased Water Used by Plants

Increased Evaporation

Increased Water Usage

Reduction in Runoff

Increased Severe Droughts

Streams

Silver

Ocean

Source: U.S. Global Change Research Program
Snowmelt will occur earlier, especially in Northwest.

Poses challenges to aquatic species, dam managers, and water agencies.
River runoff expected to decline in much of West
Colorado River, California, and Great Basin hit hard

Projected changes in median runoff: 2041-2060 vs. 1901-1970

Source: U.S. Global Change Research Program; Milly et al.
Temperature and precipitation limit plant distribution

Basic ecological parameters are increasingly in flux

Distribution of plant communities

Source: U.S. Global Change Research Program
Enormous variations in elevation and temperature

Lowest and tallest points in contiguous U.S. are just 85 miles apart

Mount Whitney, 14,505 feet
Death Valley, -282 feet

U.S. average temperatures: 1951-2006

Source: Climate Wizard
Wet and dry areas are often in close proximity

Orographic effect and rain shadows contribute to diversity
Climate change will shift mosaic of ecosystems

*Rising CO₂ levels will also affect plant growth*

MAP SS Current Climate

Hadley S + CO₂ (2070-2099)

CCC + CO₂ (2070-2099)
Decreasing habitat for coldwater fish

Trout, salmon, steelhead severely stressed when air above 70°F

Average air temperature (°F)

1980-1997

2020s

2040s
Birds are already on the move

*Species moving toward poles, up in elevation, in response to warming*

Source: Associated Press, Audubon Society, NOAA
Mountaintop species especially vulnerable

_Pikas may eventually run out of mountain_

Source: Carnegie Institution Department of Global Ecology
Wildfires are arriving earlier and lasting longer

Big blazes increased starting in 1980s, mostly due to warming

Western U.S. Forest
Wildfires and Spring-Summer Temperature

Timing of spring
Snowmelt

Fire Season Length

Source: Westerling et al. (2006)
Climate change expected to make wildfires worse

Change in burned area projected from 1°C warming

A - Cascade Mixes Forest
B - Northern Rocky Mt Forest
C - Middle Rocky Mt. Steppe-Forest
D - Intermountain Semi-Desert
E - Great Plains-Palouse Dry Steppe
F - Sierran Steppe-Mixed Forest
G - California Dry Steppe
H - Intermountain Semi-Desert/ Desert
J - South Rocky Mt. Steppe-Forest
K - American Semi-Desert and Desert
L - Colorado Plateau Semi-Desert
M - Ariz-New Mex. Mts. Semi-Desert
N - Chihuahuan Semi-Desert
Mountain pine beetle attacking lodgepole forests

Lack of deep freeze may be responsible for outbreak
Key points: public opinion

• The environment doesn’t rank high on the public’s agenda, but a majority of Americans remain concerned about a wide variety of environmental problems.

• The public agrees with many of the environmental movement’s policy goals, but only about a fifth of Americans identify themselves as active participants.

• The Great Recession has shifted public opinion away from environmental concerns over the past few years and there is some increasing hostility toward environmentalists.

• Air and water pollution tend to be the most worrisome environmental issues and disasters, such as the BP oil spill, can cause spikes of interest in environmental issues.
What’s the most important problem facing the U.S.?

- Economy in general
- Unemployment/Jobs
- Dissatisfaction with government
- Federal budget deficit/Federal debt
- Poor healthcare/hospitals; High cost of healthcare
- Lack of money
- Education/Poor education/Access to education
- Ethics/moral/religious/family decline; Dishonesty
- Immigration/Illegal aliens
- Care for the elderly/Medicare
- Corporate corruption
- Energy/Lack of energy sources
- Environment/Pollution
- Foreign aid/Focus overseas
- Fuel/Oil prices
- Gap between rich and poor
- International issues, problems
- Judicial system/Courts/Laws
- Lack of military defense
- Lack of respect for each other
- Poverty/ Hunger/Homelessness
- Taxes
- The media
- Unifying the country
- Wage issues
- Wars/War (nonspecific)/Fear of war
- Welfare

Source: Gallup

June 2012 survey

EcoWest.org
Elections can cause shifts in environmental opinion

Right now, do you think the quality of the environment in the country as a whole is getting better or worse?

Source: Gallup
Hostility toward environmental movement rising

Do you think of yourself as an active participant in the environmental movement; sympathetic towards the movement, but not active; neutral; or unsympathetic?

Source: Gallup
More think environmentalists have done harm

All things considered, do you think the environmental movement in this nation has done more good than harm, or more harm than good?

- Definitely more good than harm
- Probably more good than harm
- Probably more harm than good
- Definitely more harm than good
- No opinion

Source: Gallup
Do you think that protection of the environment should be given priority, even at the risk of curbing economic growth, or do you think economic growth should be given priority, even if the environment suffers to some extent?

Source: Gallup
Environment vs. economy in the West

As part of efforts to improve their state economy and generate jobs as quickly as possible, some people have proposed reducing protections on land, air and water that apply to major industries, including construction and agriculture. Would you prefer your state to reduce these protections or maintain them?

Source: State of the Rockies Project
Few Westerners want environmental laws relaxed

What is your feeling about the current status of environmental laws?

- Laws strong enough, but should be better enforced
- Laws, enforcement should be left as they are
- Laws strong enough
- Laws too strict, need to be relaxed

Source: State of the Rockies Project
Air and water pollution generate most concern

What environmental issues are most worrisome?

- Pollution of drinking water: 50%
- Contamination of soil and water by toxic waste: 50%
- Pollution of lakes, rivers, and reservoirs: 50%
- Maintenance of freshwater supply for household needs: 48%
- Loss of natural habitat for wildlife: 47%
- Air pollution: 45%
- Loss of tropical rainforests: 43%
- Damage to the ozone layer: 41%
- Extinction of plant and animal species: 39%
- Global warming: 39%
- Urban sprawl and loss of open space: 34%
- Acid rain: 22%

Source: Gallup
In West, non-pollution issues also rank high

What is the seriousness of the following environmental problems?

- Poorly-planned growth and development
- Loss of family farms and ranches
- Pollution of rivers, lakes and streams
- Air pollution and smog
- Funding cuts for state parks, natural area protection, and water quality
- Loss of habitat for fish and wildlife
- Inadequate water supplies
- Toxins and pesticides in food and drinking water
- Loss of natural areas
- The impact of mining
- The impact of oil and gas and drilling
- Lack of access to public lands
- Global warming
- Climate change
- Lack of access to lands and rivers for hunting and fishing

Source: State of the Rockies Project
Key points: conservation funding

• **Federal funding**
  – In real terms, the budgets of major environmental agencies have been fairly steady over the past decade
  – The distribution among different programs also tends to remain relatively constant

• **Ballot measures**
  – Open-space bonds and other conservation measures usually pass at the polls but considerably fewer have been put to voters during the economic downturn

• **Philanthropic**
  – The distribution of funding by issue area changes significantly from year to year
  – Energy and climate-related funding saw big increases between 2007 and 2009
How your federal tax dollars are spent

Entitlements, defense, and debt overshadow other program

- Social Security: 21%
- Defense: 20%
- Medicare: 13%
- Low-income assistance: 9%
- Medicaid: 8%
- Net interest payments: 7%
- Unemployment compensation: 5%
- Veterans Affairs: 3%
- Education: 3%
- Law enforcement/homeland security: 2%
- Transportation: 2%
- Health (not Medicare/Medicaid): 2%
- Management of federal employees and buildings: 1%
- Environmental protection and natural resources: 1%
- All others: 3%

Source: Third Way
Top federal programs related to the environment

EPA, Army Corps of Engineers, and Forest Service get most funding

- Electric reliability organizations
- Ocean oil drilling regulation and natural resource leases
- Energy efficient housing
- Lead hazard control and healthy homes
- Bureau of Ocean Energy Management, Regulation and Enforcement
- Natural Resources Conservation Service
- Efficient vehicle development
- Mine Safety and Health Administration
- U.S. Territories oversight
- Coal mine oversight and cleanup
- U.S. Geological Survey
- Dams, powerplants and reservoirs
- Department of Interior
- Bureau of Land Management
- U.S. Fish and Wildlife Service
- National Park Service
- National Oceanic and Atmospheric Administration
- Energy research, statistics and analysis
- Clean energy
- U.S. Forest Service
- U.S. Army Corps of Engineers
- Environmental Protection Agency

Billions

Source: Third Way
Funding for federal agencies tends to be steady

*Stimulus funds created temporary bump in 2009*

Department of Interior budget: 2003-2013

- Other
- Offices of the Solicitor and Inspector General
- Minerals Management Service/Ocean Energy Management
- Insular Affairs
- Office of Special Trustee for American Indians
- Office of Surface Mining
- Geological Survey
- Bureau of Reclamation
- Bureau of Land Management
- Department Wide Programs
- Fish and Wildlife Service
- Departmental Management
- Bureau of Indian Affairs
- National Park Service

Source: Department of Interior
Land and Water Conservation Fund short-changed

Royalties from off-shore drilling diverted to non-conservation programs

Outer Continental Shelf receipts and LWCF appropriations

Millions (Dollars)

Receipts received

Fund appropriations

Source: Department of Interior

EcoWest.org
Conservation ballot measures usually succeed

But fewer have been put to voters during economic downturn
Philanthropic funding varies greatly year-to-year

Climate and energy programs recently saw big increases

Change in funding: 2007 -2009

- Transportation
- Toxics
- Terrestrial Ecosystems & Land-use
- Sustainable Communities
- Sustainable Agriculture & Food Systems
- Population
- Material Consumption & Waste Management
- International Trade & Finance
- Indigenous Populations/Communities
- General/Multiple/Undefined
- Fresh Water/Inland Water Ecosystems
- Environmental Justice
- Environmental Health
- Energy
- Coastal & Marine Ecosystem
- Climate/Atmosphere
- Biodiversity & Species Preservation

Source: Environmental Grantmakers Association
Overall takeaways

- The human footprint in the West is surprisingly large and agriculture has the biggest physical imprint in the region
- Growth and climate change are compounding the water crisis in a region with an inherently capricious supply
- Even without climate change, many species would be in trouble, largely due to habitat loss and invasive species
- Wildfires are generally growing larger and will only get worse as the region warms and the snowpack thins
- Most Westerners want a vibrant economy and a healthy environment, but hostility toward environmentalists may be rising
- There’s reason for hope: we’re generally getting cleaner and more efficient in our use of natural resources
Download more slides and other resources
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Visualizing environmental trends

2012 was hottest year on record for U.S.

January 8, 2013 1:54 PM 0 COMMENTS | EDIT

No doubt about it: 2012 was toasty. Today, the National Oceanic and Atmospheric Administration reported that 2012 was not only the warmest on record for the lower 48 since 1895 but also the second-worst on a measure known as the Climate Extremes Index, which includes factors such as temperature anomalies, drought patterns, and the [...]
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