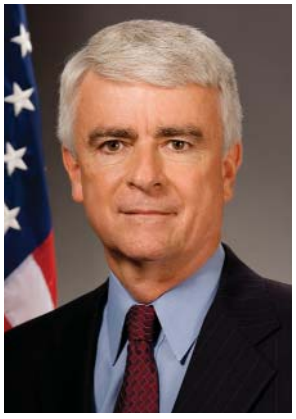
GOAL 4:

Healthy Communities *and* Ecosystems

Protect, sustain, or restore the health of people, communities, and ecosystems using integrated and comprehensive approaches and partnerships.



Goal 4 encompasses EPA's strategic approach to protecting, sustaining, or restoring the health of communities and ecosystems. In pursuit of this goal, EPA brings together a variety of programs, tools, and resources; creates strong partnerships with federal, state, tribal, and local government agencies; and enlists the support of many nongovernmental stakeholders.

With a mix of regulatory programs and partnership approaches the Agency achieves results in ways that are efficient, innovative and sustainable. A key component of Goal 4 is identifying, assessing, and reducing the risks presented by the thousands of chemicals and pesticides on which our society and economy have come to depend. EPA continues to work collaboratively with other nations and international organizations to identify, develop, and implement policy options to address global environmental issues of mutual concern. Following this, EPA strives to build a community's capability to make decisions that affect the environment. EPA's efforts to share information and provide assistance offers the tools needed to effectively address the myriad aspects of planned development or redevelopment. These contributions are tailored to circumstances spanning the issues of sensitive communities and international cooperation. In a similar manner, EPA's ecosystem protection programs encompass a wide range of approaches that address specific at-risk regional areas, such as large waterbodies. EPA also works with partners to protect larger categories of threatened systems, such as estuaries and wetlands. In cooperation with the U.S. Army Corps of Engineers, EPA will assure "no net loss" of wetlands.

Science guides EPA's identification and treatment of emerging issues and advances our understanding of long-standing human health and environmental challenges. EPA's research is typically crosscutting, multidisciplinary, and at the cutting edge of environmental science; reflects the dynamic nature of science; and brings scientific rigor to the characterization of uncertainty and risk.

Jim Gulliford
Assistant Administrator
Office of Pollution Prevention and Toxic Substances

Ben Grumbles
Assistant Administrator
Office of Water

George Gray
Assistant Administrator
Office of Research and Development

GOAL 4:

Healthy Communities and Ecosystems

Communities and ecosystems are extremely complex systems of enormous variety. To protect and sustain them, EPA is working to manage environmental risks—from risks presented by the pesticides and chemicals on which we depend, to threats to our watersheds, to hazards posed by pollutants entering our homes, schools, workplaces, and neighborhoods. We work to protect critical ecosystems, such as wetlands and estuaries, and collaborate with states and others on "place-based" efforts to protect resources such as the Great Lakes, Chesapeake Bay, and Gulf of Mexico. We direct our risk-management efforts toward the greatest threats in our communities and the most sensitive populations, including children, the elderly, Native Americans, and residents of areas that may be disproportionately exposed to environmental hazards.

Our strategy for reducing risk calls first for preventing pollution at its source. When programs to prevent pollution are not viable, however, we strive to minimize the waste generated, avoid harming habitat, ensure that wastes are disposed of safely, and remediate contamination that does occur.

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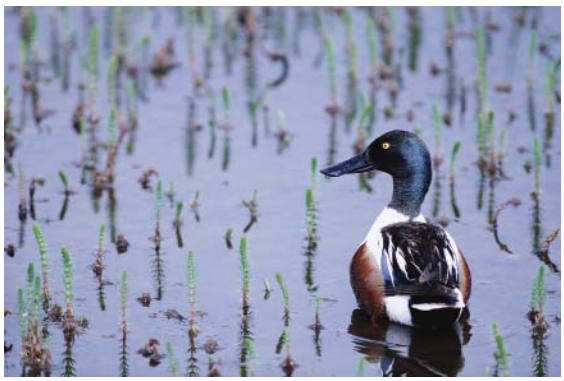
Key to protecting the health of people, communities, and ecosystems is identifying, assessing, and reducing the risks presented by the thousands of chemicals on which our society and economy have come to depend. We ensure that chemicals and pesticides entering the market meet health and safety standards and register them for use. And we continue to review chemicals already in commerce to reduce potential risk.

Many of EPA's programs to achieve and sustain healthy communities and ecosystems are designed to bring tools, resources, and approaches to bear at the local level. We build community capacity by providing information to understand risk and to evaluate the effects of development on health and the environment. We encourage redevelopment by providing funds to inventory, assess, and clean up the hundreds of thousands of properties that lie abandoned or unused due to previous pollution. Ensuring that homes have access to clean, safe drinking water and basic sanitation is a high priority, and we are assisting communities in addressing local pollution and infrastructure challenges. These local and regional initiatives often rely on collaboration among federal, state, tribal, and

local government agencies; business and industry; environmental groups; and other stakeholders. Such successful partnerships have been instrumental in soliciting community involvement and promoting a sense of environmental stewardship to sustain environmental improvements.

EPA's programs for protecting ecosystems encompass a wide range of approaches that address specific at-risk regional areas—"placed-based initiatives"—and larger categories of threatened systems, such as estuaries and wetlands. Pollution generated locally, combined with pollutants carried by rivers and streams or deposited from the air, can accumulate in ecosystems and degrade them over time. Large water bodies, such as the Gulf of Mexico, Great Lakes, and Chesapeake Bay, have been exposed to substantial pollution over many years, and coastal estuaries and wetlands are also vulnerable. As the population in coastal regions grows, the challenges to preserve and protect these important ecosystems increase. Working with our partners and stakeholders, we have established special programs to protect and restore these unique resources.

Collaborative efforts are also key to enhancing and sustaining environmental progress domestically and abroad. EPA works with other U.S. government agencies and cooperates with other nations and international organizations to identify, develop, and implement policies for addressing environmental problems. Through such organizations as the North American Commission on Environmental Cooperation, we implement agreements to reduce transboundary pollution and protect the health of citizens on our borders. We strive to leverage funding and other resources to assist developing countries in managing their natural resources and protecting their citizens' health. We work to incorporate and support environmental protection provisions in all international trade agreements negotiated by the United States.



Underpinning all of this work is sound science. Sound science guides us in identifying and addressing emerging issues and advances our understanding of long-standing human health and environmental challenges. EPA's research is at the leading edge of environmental science; it cuts across environmental media and academic disciplines to characterize potential risks and benefits. EPA conducts "core research" that builds scientific knowledge of human health and ecology and informs decision making. To further our ability to measure and describe environmental conditions, EPA researchers advance monitoring and assessment programs and enable such reviews as EPA's Report on the Environment.[1] Our research encourages stewardship and sustainable solutions that can prevent pollution by building environmental protection into national economic and individual consumer decisions.

OBJECTIVE 4.1: CHEMICAL, ORGANISM, AND PESTICIDE RISKS

By 2011, prevent and reduce pesticide and industrial chemical risks to humans, communities, and ecosystems.

Sub-objective 4.1.1: Reduce Chemical Risks. By 2011, prevent and reduce chemical risks to humans, communities, and ecosystems.

Strategic Targets

- By 2011, eliminate or effectively manage risks associated with 100 percent of High Production Volume (HPV) chemicals for which unreasonable risks have been identified through EPA risk assessments. (Baseline: EPA screening of data obtained through the HPV Challenge Program is commencing in 2006; actions to obtain additional information needed to assess risks will commence subsequently as chemicals are identified as priority concerns through the screening process.)[2]
- Through 2011, ensure that new chemicals introduced into commerce do not pose unreasonable risks to workers, consumers, or the environment. (The FY 2004 and FY 2005 baseline is 100 percent.)[3]
- By 2011, achieve a 26 percent cumulative reduction of chronic human health risk from environmental releases of industrial chemicals in commerce since 2001. (Baseline: Cumulative reduction reported from 2002-2003 is 6.6 percent.)[4]
- By 2010, eliminate childhood lead poisoning as a public health concern by reducing to 0 the number of cases of children (aged 1-5 years) with elevated blood lead levels (>10ug/dl). (The 1999-2002 baseline is 310,000 cases.)[5]
- By 2010, reduce to 28 percent the percent difference in the geometric mean blood lead level in low-income children 1-5 years old as compared to the geometric mean for non-low-income children 1-5 years old. (The 1991-1994 baseline is 37 percent.)[6]

- By 2011, through work with international partners, eliminate the use of lead in gasoline in the remaining 35 countries that still use lead as an additive, affecting more than 700 million people. (Baseline: As of January 2006, 35 countries had not phased lead out of gasoline.)[7]
- By 2011, through work with international partners, more than 3 billion people will have access to low-sulfur fuel in 10 countries, including China, India, Mexico and Brazil. (Baseline: As of January 2006, none of the developing countries had access to low-sulfur fuel.)[8]

Sub-objective 4.1.2: Reduce Chemical Risks at Facilities and in Communities. By 2011, protect human health, communities, and the environment from chemical releases through facility risk-reduction efforts and building community preparedness and response capabilities.

Strategic Targets

- By 2011, continue to maintain the Risk Management Plan (RMP) prevention program and further reduce by 5 percent the number of accidents at RMP facilities. (The baseline is an annual average of 340 accidents, based on RMP program data through 2003.)
- By 2011, reduce by 5 percent the consequences of accidents at RMP facilities, as measured by injuries, fatalities, and property damage. (The baseline is an annual average of 358 injuries, 13 fatalities, and $143.5 million in property damage at RMP facilities from 1995-2003.)
- By 2011, vulnerability zones surrounding RMP facilities will be reduced by 5 percent from the 2004 baseline, which will result in the reduction of risk for more than 4 million people in the community. (The 2004 baseline is 1,086,428 mi_2 of cumulative area of RMP facility vulnerability zones.)[9]
- By 2011, improve by 10 percent from the 2007 baseline the capabilities of Local Emergency Planning Committees (LEPCs) to prevent, prepare for, and respond to chemical emergencies (as measured by a survey of those LEPCs), thereby reducing the risk to communities from the potentially devastating effects of chemical accidents.

Sub-objective 4.1.3: Protect Human Health from Pesticide Risk. Through 2011, protect human health by implementing our statutes and taking regulatory actions to ensure pesticides continue to be safe and available when used in accordance with the label.

Strategic Targets

- By 2011, reduce the concentration of pesticides detected in the general population by 50 percent. (Baselines are determined from 1999-2002 Centers for Disease Control-National Health and Nutrition Examination Survey [NHANES] data.)[10]
- Through 2011, protect those occupationally exposed to pesticides by improving upon or maintaining a rate of 3.5 incidents per 100,000 potential risk events. (Baseline: There were 1,385 occupational pesticide incidents in 2003 out of 39,850,000 potential pesticide risk events/year.)[11]
- By 2011, improve the health of those who work in or around pesticides by reaching a 50 percent targeted reduction in moderate to severe incidents for 6 acutely toxic agricultural pesticides with the highest incident rates: chlorpyrifos, diazinon, malathion, pyrethrins, 2,4-dichlorophenoxy

acetic acid (2,4-D), and carbofuran. (Baselines will be determined from the Poison Control Center (PCC) Toxics Exposure Surveillance System (TESS) database for 1999-2003.)[12]

Sub-objective 4.1.4: Protect the Environment from Pesticide Risk. Through 2011, protect the environment by implementing our statutes and taking regulatory actions to ensure pesticides continue to be safe and available when used in accordance with the label.

Strategic Targets

- By 2011, reduce the percentage of urban watersheds that exceed the National Pesticide Program aquatic life benchmarks for three key pesticides of concern (diazinon, chlorpyrifos, and malathion). (The 1992–2001 baselines as a percentage of urban watersheds sampled that exceeded benchmarks are: diazinon, 40 percent; chlorpyrifos, 37 percent; and malathion, 30 percent.)[13]
- By 2011, reduce the percentage of agricultural watersheds that exceed EPA aquatic life benchmarks for two key pesticides (azinphos-methyl and chlorpyrifos). (Based on 1992–2001 data, 18 percent of agricultural watersheds sampled exceeded benchmarks for azinphos-methyl and chlorpyrifos.)

Sub-objective 4.1.5: Realize the Value from Pesticide Availability. Through 2011, ensure the public health and socio-economic benefits of pesticide availability and use are achieved.

Strategic Targets

- By 2011, annually continue to avoid $1.5 billion in crop loss by ensuring that safe and effective pesticides are available to address emergency pest infestations.[14]
- By 2011, annually continue to avoid $900M in termite structural damage by ensuring that safe and effective pesticides are registered/re-registered and available for termite treatment.[15]

Means and Strategies for Reducing Risks from Chemicals and Pesticides

EPA works with other federal agencies, states, tribes, industry, environmental groups, international entities, and other stakeholders to reduce the risks that chemicals and pesticides can present to people, communities, and ecosystems. Our strategies for protecting public health and the environment rely heavily on these partnerships and on voluntary efforts by manufacturers, consumers, and the public.

Reducing Risks from Chemicals

EPA uses a two-pronged strategy to prevent and reduce risks posed by chemicals and microorganisms: prevent chemicals and organisms that pose unreasonable risks from entering U.S. commerce, and screen chemicals already in commerce for potential risk.

The 1977 Toxic Substances Control Act (TSCA) requires that EPA review all new industrial chemicals and organisms before they can be produced or imported and that we be notified of significant new uses for certain chemicals that we have already reviewed.[16] We will continue to screen, assess, and reduce risks posed by the 66,600 chemicals that were in use before TSCA was enacted. Thousands of these chemicals are still used today, and nearly 3,000 of them

are HPV chemicals, produced or imported into the United States in quantities exceeding 1 million pounds per year. Under the HPV Challenge Program,[17] approximately 400 companies and 100 consortia have voluntarily provided critical hazard screening data on almost 1,400 HPV chemicals, and we will continue to make this information available to the public.[18] We will continue to participate in the Organization for Economic Cooperation and Development (OECD) Screening Information Data Set program,[19] the international equivalent of our domestic HPV Challenge Program.

Under our New Chemicals Program, we will continue to review pre-manufacture notices to assess 1,300-1,500 new chemicals or organisms each year. Using advanced screening tools, we can estimate the potential health and environmental hazards of chemicals released to the environment.[20] We will also use these tools to encourage development of safer or "greener" new chemicals. Under our Sustainable Futures initiative, we provide chemical manufacturers with the same screening tools we use to evaluate potential health risks and environmental impact.[21] As more companies voluntarily pre-screen their products, we expect to see fewer problematic new chemicals, leading to measurable efficiencies in our review efforts. We will continue to submit our screening tools and models for rigorous peer review, and we will update and expand them accordingly.

Addressing Lead and Other High-Risk Chemicals

EPA targets risk-reduction efforts at specific chemicals and environmental justice concerns. For example, as a result of federal efforts since the 1990s, children's blood lead levels in the United States have declined dramatically, and we expect to eliminate childhood lead poisoning as a public health concern by 2010. Toward that goal, we are developing a program to address lead hazards created by renovation, repair, and painting. We are also working to eliminate the disparity in blood lead levels between low-income and other populations and to address other environmental justice concerns. We will exercise continued vigilance to ensure that no resurgence in childhood lead poisoning occurs.

Internationally, we will reduce children's exposure to lead through the global Partnership for Clean Fuels and Vehicles, which is working to eliminate lead from gasoline, reduce sulfur in fuels, and introduce cleaner vehicle technologies. Reducing sulfur in fuel will decrease vehicle emissions of particulate matter, addressing a growing public health concern in many countries, particularly in the developing world.

EPA is also evaluating emerging chemical concerns and taking action to manage risks. Perfluorooctanoic acid (PFOA), a persistent chemical causing systemic and developmental toxicity in animal studies, has been found in

human blood and has a half-life in humans measured in years.[22] We will work with the 8 major U.S. operations that generate or use PFOA to reduce their facility emissions and the levels of PFOA, PFOA precursors, and related chemicals in their products by 95 percent no later than 2010 and to eliminate them by 2015.

Mercury is a potent neurotoxin that places adults, children, and developing fetuses at risk for a variety of health problems, including developmental delays. The United States has been a catalyst for increasing international collaboration, building other countries' capacities, and promoting data-sharing to characterize and reduce mercury use and releases around the world. We will participate in demonstration, training, public awareness, and information-sharing programs to achieve measurable reductions in the commercial and manufactured products, coal combustion, artisanal and small-scale gold mining, and chlor-alkali sectors, which together account for up to 80 percent of global anthropogenic mercury emissions.

We will continue our multimedia efforts to prevent new persistent, bioaccumulative, toxic (PBT) chemicals from entering commerce and to reduce the risks associated with PBTs already in use, including mercury and polychlorinated biphenyls (PCBs). We will ensure that PCB waste is stored and disposed safely, and we will advise the regulated community on remediating PCB contamination, handling PCB disposal applications promptly, and overseeing PCB-permitted storage and disposal facilities.

Tribal environmental and health issues will continue to be a priority for our chemical program. We will use risk assessment methods that take into account the different risk profiles of some tribal lifestyles, and we will provide information and tools to help prevent adverse effects on these sensitive populations. EPA will also implement lead, asbestos, and PCB programs in tribal communities.

Reducing Risks from Accidental Chemical Releases

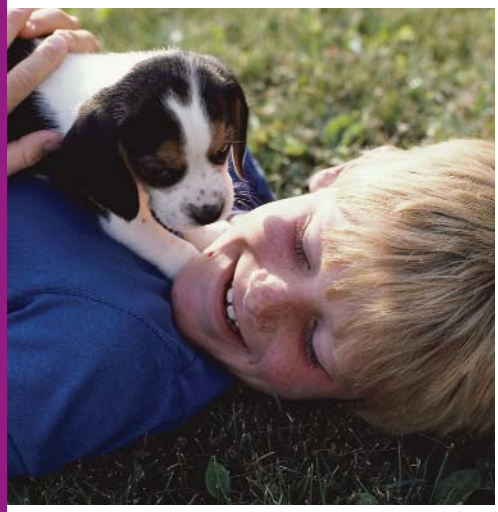
EPA is working to identify, better understand, and prevent potential risks from accidental chemical releases. Under our Risk Management Plan (RMP) Program,[23] we have audited approximately 1,800 RMP facilities and processed more than 12,000 RMPs since 2003. We will continue to analyze data collected under the RMP and Emergency Planning and Community Right-to-Know[24] programs to identify the types and locations of facilities with the greatest potential for chemical accidents and releases and to identify susceptible and sensitive populations that may be at higher risk. We will use this information to develop voluntary initiatives for high-risk facilities and geographic areas.

In the event that a chemical emergency does occur, protecting federal, state, and local first responders and on-site personnel is critical. EPA provides emergency personnel with information they need to take necessary precautions and treat individuals who may be on the scene. We are collaborating with other federal, private, and academic organizations to more quickly develop Acute Exposure Guideline Levels, which emergency responders use in planning and mitigation efforts.[25]

Reducing Pesticide Risks to Health

EPA's Pesticide Program screens new pesticides before they reach the market and ensures that pesticides already in commerce are safe.[26] Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Federal Food, Drug, and Cosmetic Act

(FFDCA), and the Food Quality Protection Act (FQPA) of 1996 that amended FIFRA and FFDCA, EPA is responsible for licensing and re-licensing pesticides to protect consumers, pesticide users, workers who may be exposed to pesticides, children, and other sensitive populations. To make regulatory decisions and establish tolerances or maximum allowable pesticide residues on food and feed, we must balance the risks and benefits of using the pesticide, consider cumulative and aggregate risks, and ensure extra protection for children.



Our Pesticide Registration Program will continue to screen pesticide products before they enter the market.[27] We will review pesticide data and implement use restrictions and instructions needed to ensure that pesticides used according to label directions will not result in unreasonable risk. During our pre-market review, we will consider human health and environmental concerns as well as the pesticide's potential benefits. Under our Reregistration Program, we will continue to review existing registrations to ensure they meet current scientific standards and address concerns identified after the original registration.[28] In addition, we will meet a provision under FQPA (related to the FIFRA requirement for reregistration) for Registration Review, a periodic review of existing pesticide registrations to ensure that they meet the most current standards.

EPA began promoting reduced-risk pesticides in 1995 by giving registration priority to pesticides that will have low impact on human health; low toxicity to non-target birds, fish, and plants; low potential for contaminating ground water; lower use rates; and low pest resistance potential and that will comport with Integrated Pest Management approaches.[29] Several countries and international organizations have instituted programs to facilitate registering reduced risk pesticides. We will continue to work with the international scientific community and OECD member countries to register 12 new reduced-risk pesticides and to establish related tolerances (maximum residue limits). Through these efforts, we can help to reduce risks to Americans from foods imported from other countries.

An important part of our Pesticide Program is the work done in the field to ensure that the decisions made during our licensing and re-licensing processes are implemented in pesticide use. An estimated 1.8 million agricultural workers could be exposed to pesticides, and millions of individuals use pesticides in occupations such as lawn care, healthcare, food preparation, and landscape maintenance.[30] Each year, the risk assessments that we conduct yield extensive risk-management requirements for hundreds of pesticides and uses. Working closely with states, tribes, and other federal agencies, our field programs address worker safety, provide certification and training on using more hazardous pesticides, protect endangered species, and encourage environmental stewardship. For example, through our Pesticide Environmental Stewardship Program, we form partnerships with pesticide users and work with them on pollution prevention strategies and Integrated Pest Management techniques that can reduce their use of pesticides and lower risks. We will continue to reduce the number and severity of pesticide exposure incidents by promulgating regulations under the Worker Protection Standard, training and certifying pesticide applicators, assessing and managing risks, and developing effective communication and outreach programs. Working with our state, tribal, and other regulatory partners, we will acquire information on local pesticide use patterns, geological conditions, location of endangered species, and tribal cultural practices that will help us assess risks and make practical, effective decisions.

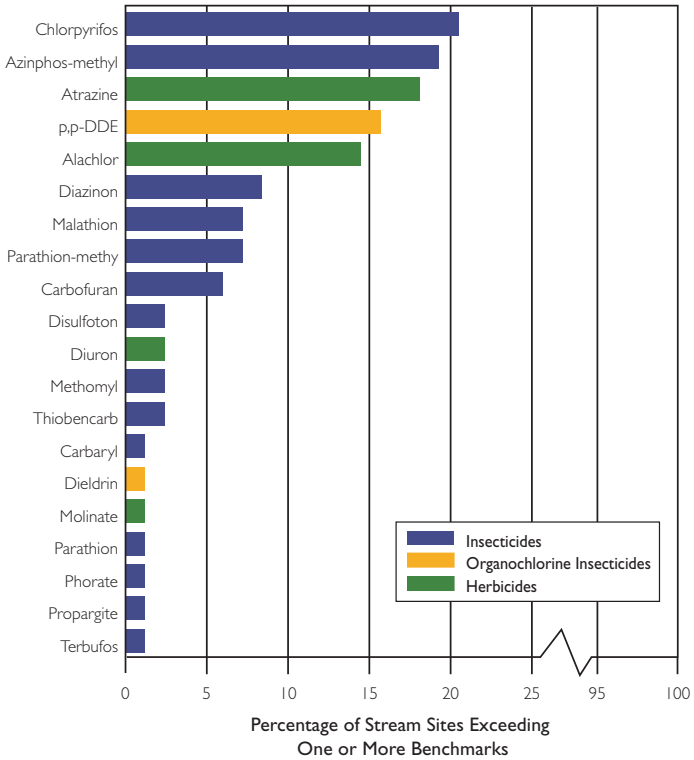
Reducing Pesticide Risks to Ecosystems

Along with assessing the risks that pesticides pose to human health, EPA conducts ecological risk assessments to determine potential effects on plants, animals, and ecosystems. We work to protect ecosystems, particularly the plants and animals that are not targets of the pesticide, and we have additional responsibilities under the Endangered Species Act (ESA).[31] Under FIFRA, we must determine that a pesticide is not likely to harm the environment, and we may impose risk mitigation measures such as restricting uses, denying uses, or requiring monitoring of environmental conditions, such as effects on water sources.[32]

Reduced concentrations of pesticides in water sources indicate the efficacy of EPA's risk assessment, management, mitigation, and communication activities. Using sampling data collected under the U.S. Geological Survey's (USGS) National Water Quality Assessment program, we will monitor the impact of our regulatory decisions for four pesticides of concern—diazinon, chlorpyrifos, malathion, and azinphos-methyl—and consider whether any additional action is necessary.[33] We will work with USGS to develop sampling plans and refine goals, and we will ask USGS to add additional insecticides to sampling protocols and establish baselines for newer products that are replacing organophosphates, such as synthetic pyrethroids.

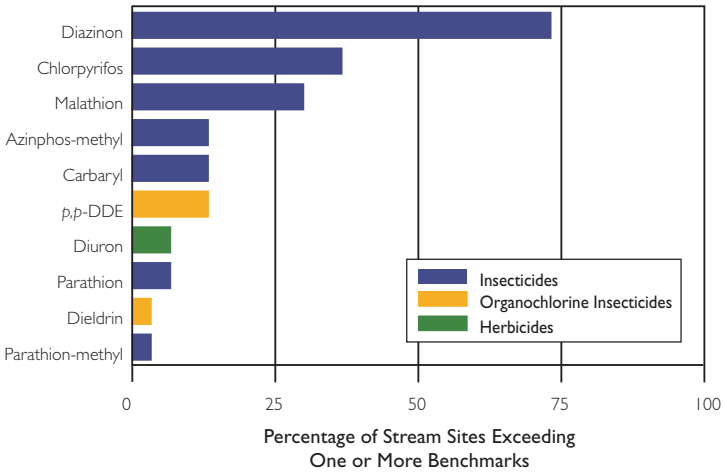
Under ESA, we must ensure that pesticide regulatory decisions will not adversely modify critical habitat or jeopardize listed species.[34] Given approximately 600 active ingredients in more than 19,000 products—many of which have multiple uses—and approximately 1,200 listed species with diverse habits and habitat requirements, this presents a great challenge. We are working with the U.S Fish and Wildlife Service and National Marine Fisheries Service to

Pesticides With Concentrations Greater Than an Aquatic-Life Benchmark, Agricultural Streams



Contributions of individual pesticides to exceedances of aquatic-life benchmarks for water show the significance of insecticides in urban streams, particularly diazinon, chlorpyrifos, and malathion during the 1992-2001 study period. In agricultural streams, most exceedances of benchmarks were by chlorpyrifos, azinphos-methyl, atrazine, *p,p'*-DDE, and alachlor.

Pesticides With Concentrations Greater Than an Aquatic-Life Benchmark, Urban Streams



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establish an efficient process for carrying out our ESA obligations. Together, we are developing "counterpart regulations" that provide EPA authority to make certain determinations without further consultation. We will make assessing risks to endangered species a priority and consider endangered species routinely in EPA reviews.[35]

Realizing the Value of Pesticide Availability

To protect public health and the environment from risks posed by pesticides and to promote safer means of pest control, EPA registers pesticides under the authority of Section 3 of FIFRA. FIFRA requires us to determine that the pesticide will not present an unreasonable adverse effect, that is, "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide." EPA's registration programs under FIFRA thus ensure that the nation has access to effective pesticides that eliminate or limit losses and are protective of human health and the environment. For example, an estimated $900 million in termite damage is avoided each year through the availability of effective termiticides. While some effective termiticides have been removed from the market due to safety concerns, EPA continues to work with industry to register safe alternatives that meet or exceed all current safety standards and offer a high level of protection.

In the event of an emergency, FIFRA Section 18 also provides EPA the authority to temporarily exempt certain pesticide uses from registration requirements. We must ensure that, under the very limiting provisions of the exemption, such emergency uses will not present an unreasonable risk to the environment. EPA's timely review of emergency exemptions has avoided an estimated $1.5 billion in crop losses per year. Exemptions may be granted for one-time events or to respond to emergency situations resulting from new pests on crops when exemptions are necessary while progress is made towards full registration. In such cases, EPA's goal is to complete the more detailed and comprehensive unreasonable risk review conducted for pesticide registration within 3 years.

Endocrine Disruptors

EPA needs valid tests to assess new chemicals' and pesticides' potential for endocrine disruption. The Endocrine Disruptor Screening Program will work to validate the screens and tests needed before large-scale reviews can take place. We will continue to obtain technical advice on the validation of tests from external experts. EPA is also working to minimize the use of animals for these tests.

OBJECTIVE 4.2: COMMUNITIES

Sustain, clean up, and restore communities and the ecological systems that support them.

Sub-objective 4.2.1: Sustain Community Health. By 2011, reduce the air, water, and land impacts of new growth and development through use of smart growth strategies in 30 communities that will achieve significant measurable environmental and/or public health improvements. (Baselines for criteria air pollutants, land consumption, and storm water run-off prior to EPA assistance will be established for each community.)[36]

Sub-objective 4.2.2: Restore Community Health Through Collaborative Problem-Solving. By 2011, 30 communities with potential environmental justice concerns will achieve significant measurable environmental or public health improvement through collaborative problem-solving strategies. (Baseline: In 2006, 20 communities with potential environmental justice concerns are in the process of using collaborative problem-solving strategies in efforts to achieve environmental or public health improvement. Community-specific baselines will be developed by 2008 for assessing improvement.)[37]

Sub-objective 4.2.3: Assess and Clean Up Brownfields. Working with state, tribal, and local partners, promote the assessment, cleanup, and sustainable reuse of brownfields properties.

Strategic Targets

- By 2011, conduct environmental assessments at 13,900 (cumulative) properties. (Baseline: As of the end of FY 2005, EPA assessed 7,900 properties.)

- By 2011, make an additional 1,125 acres of brownfields ready for reuse from the 2006 baseline. (The 2006 baseline will be available in 2007. See "Performance Measurement" section below.)
- By 2011, leverage $12.9 billion (cumulative) in assessment, cleanup, and redevelopment funding at brownfields properties. (FY 2005 baseline is $7.5B.)[38]

Sub-objective 4.2.4: Sustain and Restore the U.S.-Mexico Border Environmental Health. By 2012, sustain and restore the environmental health along the U.S.-Mexico border through implementation of the "Border 2012" plan.

Strategic Targets

- By 2012, achieve a majority of currently exceeded water quality standards in impaired transboundary segments of U.S. surface waters. (2002 baseline: 17 currently exceeded water quality standards were identified for 10 transboundary segments of U.S. surface waters.)

- By 2012, provide safe drinking water to 25 percent of homes in the U.S.-Mexico border area that lacked access to safe drinking water in 2003. (2003 baseline: 98,515 homes lacked access to safe drinking water.)[39]
- By 2012, provide adequate wastewater sanitation to 25 percent of homes in the U.S.-Mexico border area that lacked access to wastewater sanitation in 2003. (2003 baseline: 690,723 homes lacked access to wastewater sanitation.)[40]
- By 2012, cleanup five waste sites (two abandoned waste tire sites and three abandoned hazardous waste sites) in the U.S.-Mexico border region.

Sub-objective 4.2.5: Sustain and Restore Pacific Island Territories. By 2011, sustain and restore the environmental health of the U.S. Pacific Island Territories of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands.

Strategic Targets

- By 2011, 95 percent of the population in each of the U.S. Pacific Island Territories served by community drinking water systems will receive drinking water that meets all applicable health-based drinking water standards throughout the year. (2005 baseline: 95 percent of the population in American Samoa, 10 percent in the Commonwealth of the Northern Mariana Islands, and 80 percent of Guam served by community water systems received drinking water that meets all applicable health-based drinking water standards throughout the year.)
- By 2011, the sewage treatment plants in the U.S. Pacific Island Territories will comply 90 percent of the time with permit limits for biochemical oxygen demand (BOD) and total suspended solids (TSS). (2005 baseline: The sewage treatment plants in the Pacific Island Territories complied 59 percent of the time with the BOD and TSS permit limits.)
- By 2011, beaches in each of the U.S. Pacific Island Territories monitored under the Beach Safety Program will be open and safe for swimming 96 percent of days of the beach season. (2005 baseline: Beaches were open and safe 64 percent of the 365-day beach season in American Samoa, 97 percent in the Commonwealth of the Northern Mariana Islands, and 76 percent in Guam.)

Sub-objective 4.2.6: Reduce Persistent Organic Pollutant Exposure. By 2011, reduce the mean maternal serum blood levels of persistent organic pollutant (POP) contaminants in indigenous populations in the Arctic.[41]

Strategic Targets

- By 2011, reduce mean maternal blood levels of polychlorinated biphenyls (PCBs) (measured as

Aroclor 1260) in indigenous populations in the Arctic to 5.6 µg/l. (The 2006 calculated baseline mean maternal serum level for PCBs was 6.3 µg/l.)

- By 2011, reduce mean maternal blood levels of chlordane (measured as the metabolites oxychlordane and trans-nonachlor) in indigenous populations in the Arctic to 1.1 µg/l. (The 2006 calculated baseline mean maternal serum level for total chlordane was 1.3 µg/l.)

Means and Strategies for Sustaining and Restoring Communities

EPA is committed to sustaining and restoring the health of our communities and the ecological systems that support them. We are working to build capabilities in communities across the United States to ensure clean and safe water for drinking, swimming, and fishing; healthy air; and safe management of waste and waste by-products. Our work with communities will also include efforts to address environmental justice and tribal issues and to advance environmental stewardship and sustainable practices. Achieving these goals will require cross-media coordination and innovative strategies, tailored by community stakeholders. As we expand our knowledge of environmental conditions, stressors, and solutions, we expect community-based strategies for environmental protection to become even more effective.

EPA's strategy for community-based protection of local natural resources is based on four components:

- *Inform local decision making*. We will continue to improve information exchange and access to environmental information.
- *Build local capacity*. We will develop and deliver tools to help local agencies and community groups use environmental assessment and planning data, work collaboratively and cooperatively with a range of stakeholders, and participate more fully in environmental decision making.

- *Provide technical and financial assistance directly to communities*. We will help neighborhood groups adopt comprehensive, integrated approaches to environmental problems. For example, our Community Action for a Renewed Environment (CARE) Program provides competitive grants to help communities create collaborative partnerships to reduce releases and minimize exposure to toxins.[42] Through programs like CARE, we expect that by 2011 more than 100 community partnerships will be involving the public in addressing disproportionate environmental risks. Through international free trade

agreements, our community assistance efforts will extend to some of our international trading partners, promoting ecologically compatible development abroad.

- *Ensure that national policies and programs support, rather than hinder, comprehensive, integrated management of local resources.* We will review new policies and regulations to ensure that federal programs are compatible with local efforts and promote overall environmental improvement. We will continue collaborating with other federal agencies to remove barriers and create incentives for smart growth and integrated environmental management.

Restoring Healthy Communities: Environmental Justice

EPA remains committed to environmental justice for all people, regardless of race, color, national origin, or income, in accordance with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."[43] Recognizing that minority and/or low-income communities may be disproportionately exposed to environmental hazards and risks, we will work to protect these and other affected communities. Environmental justice means not only protecting human health and the environment for everyone, but also ensuring that all people are treated fairly and are given opportunities to participate meaningfully in developing, implementing, and enforcing environmental laws, regulations, and policies.

EPA is establishing measurable environmental justice commitments for eight national priorities: reducing asthma attacks, reducing exposure to air toxics, increasing compliance with regulations, reducing incidence of elevated blood lead levels, ensuring that fish and shellfish are safe to eat, ensuring that water is safe to drink, revitalizing brownfields and contaminated sites, and using collaborative problem-solving to address environmental and public health concerns. We will promote environmental justice in all aspects of our work by training staff; providing guidance, online tools, and other resources; sharing information about successful strategies; and enhancing staff skills in working with community-based organizations. We will continue to use dispute resolution, facilitation, listening sessions, and other consensus-building techniques and to convene stakeholders to address environmental and public health issues.

Assessing and Cleaning Up Brownfields

Brownfields are real properties where expansion, redevelopment, or reuse may be complicated by the presence or potential presence of hazardous substances, pollutants, or contaminants. Assessing brownfields can help communities understand the risks these properties pose and provides the information needed to undertake cleanup and reuse. Cleaning up and reinvesting in these properties may increase local tax bases, facilitate job growth, utilize existing infrastructure, take development pressures off undeveloped land,

and improve and protect the environment. EPA will continue to award competitive grants to assess and clean up brownfields and to provide job training opportunities within affected communities.

Awards are based on a number of factors including how well the project reduces threats to human health and the environment, and creates and/or preserves greenspace. In addition, the Brownfields Revitalization Act requires us to consider "the extent to which the grant would address or facilitate the identification and reduction of threats to the health or welfare of minority or low-income communities, or other sensitive populations," underlining our commitment to environmental justice.[44] Our Brownfields Program is also developing a methodology to assess the relationship between EPA-funded brownfields projects and the sensitive, socio-economically disadvantaged communities that they serve. EPA will use this methodology to improve how the Brownfields Program incorporates environmental justice concerns into its operations.

We will continue to provide funds to state and tribal governments to establish and enhance response programs that oversee the majority of brownfields assessments and cleanups. These programs provide technical oversight and assist property owners; create inventories of brownfields sites; and develop policies, regulations, and ordinances. Funding can also be used to conduct assessment and cleanup activities at brownfields properties. EPA funding is often critical for operating these response programs, particularly for tribal governments.

We will also continue to provide outreach and technical assistance to communities confronting brownfields and perform targeted assessments at sites where stakeholders are seeking federal assistance to identify the extent of contamination. Through the Brownfields and Land Revitalization Technology Support Center,[45] we will help streamline site investigations and cleanup processes, identify technology options, evaluate contractor capabilities and recommendations, and explain complex technologies to communities. Technical tools such as Triad[46] and SMARTe[47] can aid communities' brownfields efforts. EPA will continue to sponsor brownfields workshops and educational events that provide forums for sharing ideas, lessons learned, and best practices.

Reducing Transboundary Threats Along the U.S.-Mexico Border

The U.S.-Mexico Border 2012 Program, a joint effort between the governments of the United States and Mexico, works with the 10 border states and border communities to reduce transboundary threats to improve the region's environmental and ecosystem health.[48]

As part of our continuing commitment to environmental justice, EPA is working with some disadvantaged border communities to improve water quality in both the United States and Mexico. For decades, raw sewage posed a significant public health and environmental threat to U.S. and Mexican communities. Inadequate water and sewage treatment cause border residents to suffer disproportionately from hepatitis A and other waterborne diseases. EPA assists communities in the U.S.-Mexico border region to increase the number of homes with access to safe

drinking water and basic sanitation. As this infrastructure comes on line, discharges of raw sewage will be reduced and surface water quality will improve. Restoration of surface water quality on 10 impaired transboundary waters is an EPA priority.

EPA also will address health and environmental risks presented by abandoned tires and hazardous waste. Piles of waste tires breed mosquitoes and other disease-carrying organisms, and they are prone to fires that are difficult to extinguish. Contaminated hazardous waste sites pose acute and long-term risks from metal poisoning. We will address key sites on the border, laying the foundation for future remediation efforts.

To learn more, go to: www.epa.gov/owm/mab/mexican.

Restoring Island Communities

The U.S. Pacific Island Territories of American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam face severe environmental problems. Poor wastewater conveyance and treatment systems that contaminate drinking water wells and surface waters pose an immediate danger to residents. Island beaches, with important recreational, economic, and cultural significance, are polluted and frequently placed under advisories.

EPA is targeting infrastructure and nonpoint source grants toward the most serious deficiencies. We are providing technical assistance to improve island utilities' capacity for protecting public health and the environment. With island and federal partners, we will continue to develop a Territories Bond Bank that will provide access to more affordable financing, greatly enhancing the islands' ability to fund critical capital improvement projects.

Protecting Arctic Indigenous Communities

POPs transported in the atmosphere and deposited across borders pose a continuing threat to human health and the ecosystems in North America, especially the Arctic. Traditional foods expose indigenous Arctic populations, including those in Alaska, to higher levels of POPs than other populations. Addressing international sources can reduce POP levels in the Arctic, and the United States is a strong supporter of the Stockholm Convention on Persistent Organic Pollutants, a global treaty to reduce POPs which EPA helps to implement.[49]

The Arctic Monitoring and Assessment Program, which documents indigenous populations' exposure to toxics in remote areas, indicates that Russia and China are among the largest sources of POPs and other pollutants in the Arctic.[50] We will work with Russia and other Arctic Council members to reduce these pollutants and to collect, safely store, and dispose of stockpiles of obsolete pesticides. Based on EPA-led Arctic Council projects, we estimate that about 24,000 metric tons of POP pesticides will be removed from unsafe storage and destroyed by 2008,[51] and about 12,000 metric tons of PCB oil will be destroyed by 2009.[52] We will continue working to raise awareness about POPs, build capacity to prevent pollution, and share technologies to protect indigenous Arctic communities.

OBJECTIVE 4.3: RESTORE AND PROTECT CRITICAL ECOSYSTEMS

PROTECT, SUSTAIN, AND RESTORE THE HEALTH OF CRITICAL NATURAL HABITATS AND ECOSYSTEMS.

Sub-objective 4.3.1: Increase Wetlands. By 2011, working with partners, achieve a net increase in wetlands acres with additional focus on assessment of wetland condition.

Strategic Targets

- By 2011, working with partners, achieve a net increase of 100,000 acres of wetlands per year with additional focus on biological and functional measures and assessment of wetland condition. (2004 baseline: 32,000 acres annual net wetland gain.)[53]
- By 2011, in partnership with the U.S. Army Corps of Engineers, states, and tribes, achieve "no net loss" of wetlands each year under the Clean Water Act Section 404 regulatory program, beginning in 2007. (Baseline: New baseline to be determined in 2008.)

Sub-objective 4.3.2: Facilitate the Ecosystem-Scale Restoration of Estuaries of National Significance. By 2011, working with partners, protect or restore an additional (i.e., measuring from 2007 forward) 250,000 acres of habitat within the study areas for the 28 estuaries that are part of the National Estuary Program. (2005 baseline: 449,242 acres of habitat protected or restored, cumulative from 2002.)

Sub-objective 4.3.3: Improve the Health of the Great Lakes. By 2011, prevent water pollution and protect aquatic systems so that the overall ecosystem health of the Great Lakes is at least 23 points on a 40-point scale. (2005 baseline: Great Lakes rating of 21.5 on the 40-point scale where the rating uses selected Great Lakes State of the Lakes Ecosystem indicators based on a 1 to 5 rating system for each indicator, where 1 is poor and 5 is good.)[54]

CRITICAL ECOSYSTEMS

- Wetlands
- Estuaries
- Great Lakes
- Chesapeake Bay
- Gulf of Mexico
- Long Island Sound
- South Florida Ecosystem
- Puget Sound Basin
- Columbia River Basin

Strategic Targets:

- Through 2011, maintain or improve an average annual 5 percent decline for the long-term trend in average concentrations of PCBs in whole lake trout and walleye samples. (1990 baseline: Concentration levels at stations in Lakes Superior [0.45 ppm], Michigan [2.72 ppm], Huron [1.5 ppm], Erie [1.35 ppm] and Ontario [2.18 ppm].)[55]
- Through 2011, maintain or improve an average 7 percent annual decline for the long-term trend in average concentrations of toxic chemicals (PCBs) in the air in the Great Lakes Basin. (1992 baseline: Concentration levels for U.S. stations: Lake Superior [100 pg/m3], Lake Michigan [289 pg/m^3], and Lake Erie [431 pg/m^3].)[56]

- By 2010, restore and delist a cumulative total of at least 8 Areas of Concern within the Great Lakes Basin (2005 baseline: 0 Areas of Concern de-listed as of 2005 of the 31 total Areas of Concern.)[57]
- By 2011, remediate a cumulative total of 7 million yards^3 of contaminated sediment in the Great Lakes. (2005 baseline: Of the 75 million yards estimated to need remediation, 3.7 million yards^3 of contaminated sediments from the Great Lakes have been remediated from 1997 through 2004.)[58]

Sub-objective 4.3.4: Improve the Health of the Chesapeake Bay Ecosystem. By 2011, prevent water pollution and protect aquatic systems so that the overall aquatic system health of the Chesapeake Bay is improved.

Strategic Targets

- By 2011, achieve 45 percent (83,250 acres) of the 185,000 acres of submerged aquatic vegetation necessary to achieve Chesapeake Bay water quality standards. (2005 baseline: 39 percent [72,935 acres] of submerged aquatic vegetation necessary to achieve Chesapeake Bay water quality standards.)[59]
- By 2011, achieve 40 percent (29.92 km^3) of the long-term restoration goal of 100 percent attainment of the dissolved oxygen water quality standards in all tidal waters of the Bay. (2005 baseline: 34 percent [25.40 km^3] of dissolved oxygen goal achieved.)[60]
- By 2011, achieve 59 percent (95.88 million pounds) of the implementation goal for nitrogen reduction practices necessary to achieve Chesapeake Bay water quality standards, expressed as nitrogen reduction in relation to achieving a 162.5 million pound reduction from 1985 levels (based on long-term average hydrology simulations). (2005 baseline: 41 percent nitrogen goal achieved.)[61]
- By 2011, achieve 74 percent (10.63 million pounds) of the implementation goal for phosphorus reduction practices necessary to achieve Chesapeake Bay water quality standards, expressed as phosphorus reduction in relation to achieving a 14.36 million pound reduction from 1985 levels (based on long-term average hydrology simulations). (2005 baseline: 58 percent of phosphorus goal achieved.)[62]
- By 2011, achieve 74 percent (1.25 million tons) of the implementation goal for sediment reduction practices necessary to achieve Chesapeake Bay water quality standards, expressed as sediment reduction in relation to achieving a 1.69 million ton reduction from 1985 levels (based on long-term average hydrology simulations). (2005 baseline: 54 percent of sediment goal achieved.)[63]

Photo: National Oceanic and Atmospheric Administration/ Department of Commerce

Sub-objective 4.3.5: Improve the Health of the Gulf of Mexico. By 2011, the overall health of coastal waters of the Gulf of Mexico will be improved from 2.4 to 2.6 on the "good/fair/poor" scale of the National Coastal Condition Report. (2004 baseline: Gulf Coast rating of fair, or 2.4, is based on a scale where 1 is poor and 5 is good.)

Strategic Targets

- By 2011, restore water and habitat quality to meet water quality standards in 162 impaired segments (cumulative) in 13 priority coastal areas (2002 baseline: 812 impaired segments identified in Section 303(d) listings.)[64]
- By 2011, restore, enhance, or protect a cumulative 20,000 acres of important coastal and marine habitats. (2005 baseline: 16,000 acres restored, enhanced, or protected; Gulf of Mexico coastal wetland habitats include 3,769,370 acres.)[65]
- By 2015, reduce releases of nutrients throughout the Mississippi River Basin to reduce the size of the hypoxic zone in the Gulf of Mexico to less than 5,000 km^2, as measured by the 5-year running average of the size of the zone. (Baseline: 2002-2006 running average size = 14,944 km^2.)[66]

Sub-objective 4.3.6: Restore and Protect Long Island Sound. By 2011, prevent water pollution, improve water quality, protect aquatic systems, and restore the habitat of Long Island Sound by working through the Long Island Sound Management Study Conference partnership.

Strategic Targets

- By 2014, reduce point source nitrogen discharges to Long Island Sound by 58.5 percent as measured by the Long Island Sound Nitrogen Total Maximum Daily Load (TMDL). (TMDL 2000 baseline: 213,151 lbs/day; 2014 goal: 85,238 lbs/day.)[67]
- By 2011, reduce the size of hypoxic area in Long Island Sound (i.e., defined as the area in which the long-term average maximum July-September dissolved oxygen level is <3mg/l) by 25 percent; reduce average duration of maximum hypoxic event by 25 percent. (2005 baseline derived from 19-year averages as of December 2005;[68] size: 203 mi^2; duration: 58 days.)
- By 2011, restore or protect an additional 300 acres of coastal habitat, including tidal wetlands, dunes, riparian buffers, and freshwater wetlands from the 2005 baseline. (2005 cumulative baseline: 562 acres restored and 150 acres protected.)[69]
- By 2011, reopen an additional 50 miles of river and stream corridor to anadromous fish passage from the 2005 baseline through removal of dams and barriers or installation of by-pass structures such as fishways. (2005 cumulative baseline: 81 miles reopened.)[70]

Photo: National Oceanic and Atmospheric Administration/ Department of Commerce

Sub-objective 4.3.7: Restore and Protect the South Florida Ecosystem. Protect and maintain the South Florida ecosystem, including the Everglades and coral reef ecosystems.

Strategic Targets

- By 2011, achieve "no net loss" of stony coral cover (mean percent stony coral cover) in the Florida Keys National Marine Sanctuary (FKNMS) and in the coastal waters of Dade, Broward, and Palm Beach Counties, Florida, working with all stakeholders (federal, state, regional, and local). (2005 baseline: Mean percent stony coral cover 6.7 percent in FKNMS and 5.9 percent in Southeast Florida.)[71]

- Through 2011, beginning in 2008, annually maintain the overall health and functionality of sea grass beds in the FKNMS as measured by the long-term sea grass monitoring project that addresses composition and abundance, productivity, and nutrient availability. (The 2005 baseline index of sea grass health will be available in December 2006.)[72]
- Through 2011, beginning in 2008, annually maintain the overall water quality of the near shore and coastal waters of the FKNMS. (2005 baseline: For reef sites, chlorophyll less than or equal to 0.2 µg/l and vertical attenuation coefficient for downward irradiance [k_d, i.e., light attenuation] less than or equal to 0.13 per meter; for all sites in FKNMS, dissolved inorganic nitrogen less than or equal to 0.75 micromolar and total phosphorus less than or equal to 0.2 micromolar.)[73]
- Through 2011, beginning in 2008, improve the water quality of the Everglades ecosystem as measured by total phosphorus, including meeting the 10 parts per billion (ppb) total phosphorus criterion throughout the Everglades Protection Area marsh and the effluent limits to be established for discharges from storm water treatment areas. (2005 baseline: Average annual geometric mean phosphorus concentrations were 5 ppb in the Everglades National Park, 10 ppb in Water Conservation 3A, 13 ppb in the Loxahatchee National Wildlife Refuge, and 18 ppb in Water Conservation Area 2A; annual average flow- weighted total phosphorus discharges from storm water treatment areas ranged from 13 ppb for area 3/4 and 98 ppb for area 1W.)[74]

Sub-objective 4.3.8: Restore and Protect the Puget Sound Basin. By 2011, improve water quality, air quality, and minimize the adverse impacts of rapid development in the Puget Sound Basin.

Strategic Targets

- By 2011, improve water quality and enable the lifting of harvest restrictions in 1,000 acres of shellfish

bed growing areas impacted by degraded or declining water quality. (Baseline: As of January 2006, approximately 30,000 acres of shellfish bed growing areas had harvest restrictions due to water quality impairments in Puget Sound.)[75]

- By 2011, remediate 200 acres of prioritized contaminated sediments. (Baseline: As of January 2006, approximately 5,000 acres of remaining contaminated sediments required some level of remediation.)[76]
- By 2011, restore 3,500 acres of tidally- and seasonally-influenced estuarine wetlands. (Baseline: A total of approximately 45,000 acres of intertidal and near-shore habitat were identified by state, tribal, and local groups as potential restoration sites in the 2006 Puget Sound Near-Shore Restoration Site Inventory Database.)[77]
- By 2011, reduce total diesel emissions in the Puget Sound airshed by 8 percent through coordinated diesel emission mitigation efforts. (Baseline will be available in December 2006.)[78]

Sub-objective 4.3.9: Restore and Protect the Columbia River Basin. By 2011, prevent water pollution and improve and protect water quality and ecosystems in the Columbia River Basin to reduce risks to human health and the environment.

Strategic Targets

- By 2011, protect, enhance, or restore 13,000 acres of wetland habitat and 3,000 acres of upland habitat in the Lower Columbia River watershed. (2005 baseline: 96,770 acres of wetland and upland habitat available for protection, enhancement, or restoration.)

Photo: National Oceanic and Atmospheric Administration/ Department of Commerce

- By 2011, clean up 150 acres of known highly contaminated sediments. (Baseline: 400 acres of known highly contaminated sediments in the main-stem of the Columbia River and Lower Willamette River as of 2006.)
- By 2011, demonstrate a 10 percent reduction in mean concentration of contaminants of concern found in water and fish tissue. (Chemical-specific baselines will be available in 2006.)[79]

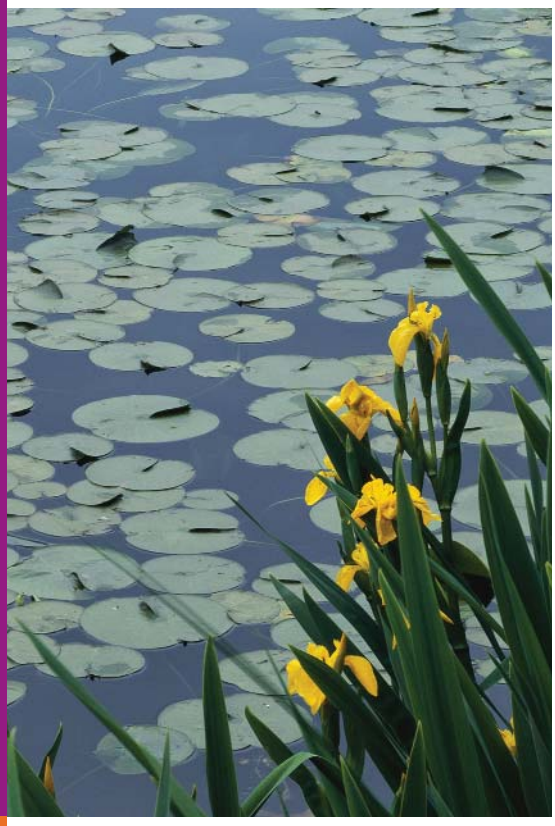
Means and Strategies for Restoring and Protecting Ecosystems

EPA protects, sustains, and restores the health of natural habitats and ecosystems by identifying and evaluating problem areas, developing tools, and improving community capacity to address problems. Over the next 5 years, we will target wetlands, estuaries, and high-priority areas such as the Great Lakes, Chesapeake Bay, Gulf of Mexico, Long Island Sound, South Florida ecosystem, Puget Sound Basin, and Columbia River. Our place-based ecosystem protection strategies focus on critical watersheds to develop and implement water quality control practices and design other tools for managing ecosystems that can be transferred to other areas nationwide.

Increasing Wetlands

Healthy wetlands protect water quality, provide habitat for fish and wildlife, store floodwater, and reduce the erosive potential of surface water. However, since the 1700s, the United States has lost more than 115 million acres of wetlands to development, agriculture, and other uses.[80] Excessive sedimentation, nutrient over-enrichment, pesticides, invasive species, habitat loss, and fragmentation are degrading wetlands.[81] And many of the wetlands we have created, while beneficial, fail to fully replace the diverse plant and animal communities of wetlands lost. To help address this issue, EPA and the U.S. Army Corps of Engineers (the Corps) jointly proposed a rule in 2006 that sets clear criteria for compensatory mitigation of wetland impacts authorized by Clean Water Act permits.

EPA is also cooperating and collaborating with federal, state, and tribal governments and other stakeholders to achieve the President's goal, set in 2004, to restore, improve, and protect 3 million acres of wetlands by 2009.[82] (Progress under the President's Initiative is reported annually in a report by the Council on Environmental Quality, *"Conserving America's Wetlands: Implementing the President's Goal."*)[83] Key EPA programs supporting this effort include the Five Star Restoration Challenge Grants, the National Estuary Program, and the Nonpoint Source Management Program.



Additionally, EPA works with the Corps to ensure "no net loss" of wetlands under Section 404 of the Clean Water Act. A key area of cooperation is applying the 404(b)(1) guidelines requiring that discharges of dredged or fill material into U.S. waters be avoided and minimized to the extent practicable and that unavoidable impacts be fully compensated. EPA will continue collaborating with the Corps to develop a set of science-based standards for all types of mitigation that compensate for wetland and other aquatic resource destruction.[84] We will also work with the Corps to enhance data collection; track Section 404 permitted projects and associated compensatory mitigation; and provide this information to federal, state, and tribal agencies and the public.

EPA will continue to build state and tribal capacity to measure wetland function and condition. Broad-based, integrated monitoring and assessment programs inform decision makers, target restoration activities, and help us address significant stressors. Through Wetland Program development grants, EPA provides technical and financial support to strengthen state and tribal regulation, monitoring, restoration, water quality standards, mitigation compliance, and partnership-building. Programs such as the Five Star Restoration Challenge Grant Program,[85] regional geographic initiatives,[86] targeted watershed grants,[87] the National Estuary Program, and nonpoint source grants[88] provide funding, technical support, and information to help communities implement riparian, coastal, and wetland restoration projects. We are also integrating wetlands protection into our Clean Water and Brownfields Programs.

To learn more go to: www.epa.gov/owow/wetlands.

Restoring Estuaries

Estuaries are among the most biologically productive ecosystems on earth, providing numerous ecological, economic, cultural, and aesthetic benefits and services. They are also among the most threatened ecosystems, largely as a result of rapid growth and development.[89] Estuaries tend to accumulate sediments, nutrients, and other pollutants from adjacent and upstream land-based sources, profoundly affecting water quality, habitats, living resources, and human health. Overuse of natural resources and conflicts among recreational and commercial users have also resulted in a host of challenges to estuarine resources.

EPA's National Estuary Program (NEP) provides inclusive, community-based planning and action in 28 nationally significant estuaries selected by Congress and the states' governors. EPA will support and monitor all 28 NEPs in implementing approved comprehensive conservation and management plans, which identify more than 2,000 priority actions needed to protect the estuaries and restore estuarine resources. In addition, we support broad priorities identified by the NEP: developing approaches to identify and rank priority habitats; providing tools to integrate local and regional plans for growth with stormwater management; supporting development of TMDLs for coastal waters; developing and implementing nutrient management strategies, including development of nutrient water quality criteria; addressing problems of invasive species; and reducing wet weather runoff from urban and agricultural areas.

Healthy estuarine ecosystems also depend on high-quality habitat. Through interagency partnerships with federal resource agencies, such as the Estuary Habitat Restoration Council and Coastal America, we will help to protect habitat on an ecosystem-wide basis.

Estuaries in the National Estuary Program

- Albemarle-Pamlico Sounds, NC
- Barataria-Terrebonne, LA
- Barnegat Bay, NJ
- Buzzards Bay, MA
- Casco Bay, ME
- Charlotte Harbor, FL
- Coastal Bend Bays and Estuaries, TX
- Lower Columbia River, OR/WA
- Delaware Estuary, DE/NJ
- Delaware Inland Bays, DE
- Galveston Bay, TX
- Indian River Lagoon, FL
- Long Island Sound, NY/CT
- Maryland Coastal Bays, MD
- Massachusetts Bay, MA
- Mobile Bay, AL
- Morro Bay, CA
- Narragansett Bay, RI
- New Hampshire Estuaries, NH
- New York/New Jersey Harbor, NY/NJ
- Peconic Bay, NY
- Puget Sound, WA
- San Francisco Bay, CA
- San Juan Bay, PR
- Santa Monica Bay, CA
- Sarasota Bay, FL
- Tampa Bay, FL
- Tillamook Bay, OR

To learn more go to: www.epa.gov/owow/estuaries.

Great Lakes

The Great Lakes are the largest system of surface freshwater on earth, containing 20 percent of the world's surface freshwater and accounting for about 84 percent of the surface freshwater in North America. The watershed includes 2 nations, 8 American states, a Canadian province, more than 40 tribes, and more than $\frac{1}{10^{th}}$ of the U.S. population.

While certain persistent toxic substances (PTS) have been reduced significantly in the Great Lakes Basin ecosystem over the past 30 years, they continue to be present at levels that threaten human and wildlife health, warrant fish consumption advisories in all 5 lakes, and disrupt a way of

life for many in the Basin.[90] To address such problems, the President established two major Great Lakes efforts: a "Great Lakes Interagency Task Force"[91] and a Great Lakes "Regional Collaboration of National Significance" (GLRC).[92] The Great Lakes Task Force brings together 10 Cabinet department and federal agency heads to coordinate restoration of the Great Lakes, focusing on outcomes, such as cleaner water and sustainable fisheries, and targeting measurable results. In December 2005, the GLRC developed a Great Lakes Regional Collaboration Strategy[93] that federal agencies are using to guide their Great Lakes efforts. For its part, EPA is coordinating responses to new aquatic invasive species; developing a system for tracking progress toward GLRC goals; developing policy on managing peak flows at sewage treatment plants; conducting surveillance for emerging chemicals of concern; and implementing the Great Lakes Legacy Act.

The Great Lakes Legacy Act targets additional resources to clean up contaminated sediments, a significant source of PTS. Work conducted under the Legacy Act to reduce and eliminate PTS also supports the Great Lakes Binational Toxics Strategy. This international effort applies voluntary and regulatory pollution prevention tools to mercury, PCBs, dioxins/furans, certain canceled pesticides, and other targeted substances. Both the Legacy Act and the Great Lakes Binational Toxics Strategy support EPA's work with states to delist all 31 of the remaining Areas of Concern by 2025.

To learn more go to: www.epa.gov/greatlakes.

Chesapeake Bay

EPA's Chesapeake Bay work is based on a unique regional partnership formed to direct and conduct restoration of the Bay and its tidal tributaries. Partners include Maryland; Virginia; Pennsylvania; Delaware; New York; West Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; EPA, which represents the federal government; and participating citizen advisory groups. Chesapeake 2000, a comprehensive and far-reaching agreement, guides restoration and protection efforts through 2010, and focuses on improving water quality.[95] Our challenge is to reduce pollution and restore aquatic habitat to the extent that the Bay's waters can be removed from the Clean Water Act "impaired waters" list.

We will work with our partners to improve two key measures of Bay water quality: restoring submerged aquatic vegetation (SAV) and attaining the dissolved oxygen (DO) standards in the Bay's tidal waters. The Chesapeake Bay Program's long-term goal for SAV restoration is 185,000 acres and long-term goal for DO restoration is 100 percent attainment of DO standards in all tidal waters of the Bay. To achieve these long-term goals, Bay watershed models estimate that long-term annual nitrogen loadings must be reduced by 162.5 million pounds, phosphorus reduced by 14.36 million pounds, and sediment reduced by 1.69 million tons per year from 1985 levels.[96]

To achieve water quality standards in the Chesapeake Bay as soon as possible, EPA is committed to increasing the current pace of restoration. Working with our Bay Program partners, we will identify opportunities to reduce nutrient and sediment loads and find new economies and innovations to accelerate progress dramatically. A key strategy to reduce nutrient discharges is implementing advanced wastewater treatment. Another key strategy to reduce nitrogen, phosphorus, and sediment loadings is restoring and protecting riparian forests that prevent sediment and nutrient pollution from entering waterways from the land. Implementing best agricultural management practices to reduce nutrients and sediment is also key to achieving Chesapeake Bay goals, and will require close cooperation with U.S. Department of Agriculture. We will continue to work with other federal agencies and states on related initiatives to protect and restore critical Bay watershed habitat and improve fisheries management.

To learn more go to: www.epa.gov/region3/chesapeake.

Gulf of Mexico

The Gulf of Mexico's estuaries and near coastal waters support fisheries and wildlife habitats that contribute to the national and Gulf state economies. However, population growth, land development, and coastal and commercial activities are threatening the sustainability of the Gulf's marine resources. Hurricanes Katrina and Rita also wrought widespread environmental harm in 2005.

EPA's Gulf of Mexico Program[97] helps Gulf states and stakeholders work in partnership to develop a regional, ecosystem-based framework for restoring and protecting the Gulf. The 5 Gulf states have also formed a Gulf of Mexico Alliance[98] to increase collaboration, and 13 federal agencies have organized a regional partnership[99] to support the alliance.

REDUCING THE GULF HYPOXIC ZONE

Although nutrients, such as nitrogen and phosphorous, are essential for healthy marine and freshwater environments, an overabundance can trigger excessive algal growth. In the near-shore Gulf of Mexico, excessive algal growth is decreasing dissolved oxygen in the bottom water, causing a corresponding loss of aquatic habitat. This "hypoxic zone" is the largest area of hypoxia in U.S. waters that is associated with human activities.

EPA is working to reduce the hypoxic zone in the Gulf of Mexico through:

- Multi-year funding strategies that will enable states to implement measures to reduce nutrients.
- Collaborative monitoring and assessment to measure the performance of nitrogen reduction efforts.
- Updating information, in partnership with USGS and sub-basin committees, on flow, nutrient concentrations, and loadings at the mouths of each major sub-basin.
- Modeling of the hypoxic zone.
- Cooperatively implementing industry-led nonpoint source nutrient reduction strategies.
- Re-assessing nutrient load reductions achieved and the response of the hypoxic zone; water quality throughout the basin; and economic and social effects of Gulf of Mexico hypoxia.

We are also working with other partners on a national hypoxia task force to carry out key actions outlined in the Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico, with the goal of reducing the size of the hypoxic zone from about 14,000 km^2 to less than 5,000 km^2 by 2015.

(Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2001. *Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico.* Washington, DC. Available on the internet at: www.epa.gov/msbasin/taskforce/pdf/actionplan.pdf. See also Mississippi River Basin and Gulf of Mexico Hypoxia Task Force internet site: www.epa.gov/msbasin/taskforce/index.htm.)

In 2006, the Gulf of Mexico Alliance developed the Governors' Action Plan for Healthy and Resilient Coasts[100] that identifies five key priority coastal and ocean issues that are regionally significant and can be effectively addressed through cooperation at the local, state, and federal levels: (1) water quality for healthy beaches and shellfish beds, (2) wetland and coastal conservation and restoration, (3) identification and characterization of Gulf habitats for management decision making, (4) reductions in nutrient loadings, and (5) strategic environmental education across the five-state region.

To learn more go to: www.epa.gov/gmpo.

Long Island Sound

EPA is working with the States of New York and Connecticut and other federal, state, and local Long Island Sound Management Conference partners to implement a comprehensive conservation and management plan (CCMP) to restore the Long Island Sound.[101] Since levels of dissolved oxygen are critical to the health of aquatic life and viable public use of the Sound, the CCMP focuses on controlling nitrogen discharges to meet applicable water quality standards.

A bi-state nitrogen reduction agreement relies on flexible and innovative approaches, notably "bubble" management zones and exchange ratios that allow sewage treatment plant operators to "trade" nitrogen reduction obligations with each other. This approach meets water quality improvement goals while allowing plant operators to save an estimated $800 million by allocating reductions to those plants where they can be achieved most economically.[102]

We are also working with Management Conference partners to restore degraded habitats; reopen rivers and streams to anadromous fish passage; improve riparian buffers; restore SAV in key embayments; reduce the impact of toxic substances, pathogens, and floatable debris on the ecology; and promote environmental education, management, and stewardship throughout the watershed.[103]

To learn more go to: www.epa.gov/region01/eco/lis.

South Florida Ecosystem

The South Florida ecosystem encompasses 3 national parks, more than 10 national wildlife refuges, a national preserve, and a national marine sanctuary. It is home to two Native American nations and it supports the largest wilderness area east of the Mississippi River, the only living coral barrier reef adjacent to the United States, and the largest commercial and sport fisheries in Florida. But rapid population growth is threatening the health of this vital ecosystem. South Florida is home to about 8 million people, more than the populations of 39 individual states. Another 2 million people are expected to settle in the area over the next 10 to 20 years. Fifty percent of the region's wetlands have been lost to suburban and agricultural development, and the altered hydrology and water management throughout the region have had a major impact on the ecosystem.

EPA is working in partnership with several local, regional, state, and federal agencies to ensure the long-term sustainability of the region's varied natural resources, while also providing for extensive agricultural operations and an expanding population. EPA's South Florida Geographic Initiative (SFGI) is designed to protect and restore communities and ecosystems affected by environmental problems.[104] SFGI efforts include activities related to the Section 404 wetlands protection program; the comprehensive Everglades Restoration Program; the water quality protection program for the Florida Keys National Marine Sanctuary; the Southeast Florida Coral Reef Initiative, directed by the U.S. Coral Reef Task Force; the Brownfields Program; and a number of other waste management programs.

EPA will continue to implement the South Florida Assessment Project, an ecosystem assessment of the Everglades, and to work with stakeholders to develop and implement community-based approaches to mitigate sources of pollution and cumulative risk.

To learn more go to: www.epa.gov/region4/water/southflorida.

Puget Sound Basin

The Puget Sound Basin is the largest population and commercial center in the Pacific Northwest, supporting a vital system of international ports, transportation systems, and defense installations. The ecosystem encompasses roughly 20 rivers and 2,500 miles of sheltered inland waters that provide habitat to hundreds of species of marine mammals, fish, and sea birds. Puget Sound salmon landings average more than 19 million pounds per year and support an average of 578,000 sport fishing trips each year. However, while the Puget Sound currently leads U.S. waterways in shellfish production, 30,000 acres of shellfish beds have been closed to harvest since 1980. These closures affect local economies and cultural and subsistence needs for these traditional resources.

Excess nutrients have created hypoxic zones that further impair shellfish and finfish populations. In addition, recent monitoring assessments indicate that marine species in the Puget Sound have high levels of toxic contamination. Almost 5,700 acres of submerged land (about 9 mi^2) are currently classified as contaminated with toxics and another 24,000 acres as at least partially contaminated. And additional pollutants are being released: approximately 1 million pounds of toxics are released into the water and 5 million pounds into the air each year, with many pollutants finding their way into Puget Sound.

To address these issues, EPA is working with other federal agencies, states, and tribes to protect local watersheds and near-shore habitat; to protect shellfish-growing areas; to reduce nutrient and toxic discharges; and to develop more comprehensive storm water management programs. We are taking action to reduce short- and long-term discharges of toxics through diesel emissions, which are a major source of pollutants into the Sound. An essential component of our strategy for protecting Puget Sound will be addressing contaminated estuary bottom sediments while developing more effective source control strategies. Working with our state and other NEP partners, we are also initiating a comprehensive toxics source control strategy, and we expect to have an expanded toxics source control action agenda in place by 2008.

To learn more go to: www.epa.gov/pugetsound.

Columbia River Basin

More than 1,200 miles long, the Columbia River spans portions of Oregon, Washington, Idaho, Wyoming, Nevada, Utah, Montana, and a substantial portion of British Columbia. The 260,000 square mile Columbia River Basin comprises ecosystems that are home to a variety of biologically significant plants and animals and supports industries vital to the Pacific Northwest, including sport and commercial fisheries, agriculture, transportation, recreation, and electrical power generation.

Columbia River salmon and steelhead runs—once the largest on earth—are now a fraction of their original size. EPA studies and state monitoring programs have found significant levels of toxins in fish and the waters they inhabit, including dichloro-diphenyl-trichloroethane (DDT), PCBs, and dieldrin.[105] To address this problem, we will continue working with Oregon, Washington, Idaho, Columbia Basin tribal governments, the Lower Columbia River Estuary Partnership, local governments, citizen groups, industry, and other federal agencies. Together we have launched the Columbia River toxics strategy to identify and clean up contaminated sediments; restore critical wetlands; and reduce toxins in water, land, and fish. Within available resources, EPA, states, and tribes are systematically expanding such

key activities as fish, water, and sediment monitoring; pesticide stewardship partnerships; targeted pesticide/toxics collections; and precision agriculture. We are implementing TMDLs by reducing sediment loads and restoring riparian areas, and we are cleaning up the Portland Harbor Superfund site and PCB contamination in the Columbia River at Bradford Island.

The NEP also plays a key role in addressing toxics and restoring critical wetlands in the Lower Columbia River estuary. Through the NEP, we will identify contaminants of concern, identify data bases that can provide baseline data and establish new monitoring efforts to fill data gaps, and identify and implement best management practices for reducing contaminants of concern.

To learn more go to: www.epa.gov/Region10/columbia.

OBJECTIVE 4.4: ENHANCE SCIENCE AND RESEARCH

Through 2011, identify and synthesize the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions related to the health of people, communities, and ecosystems. Focus research on pesticides and chemical toxicology; global change; and comprehensive, cross-cutting studies of human, community, and ecosystem health.

Means and Strategies for Enhancing Science and Research

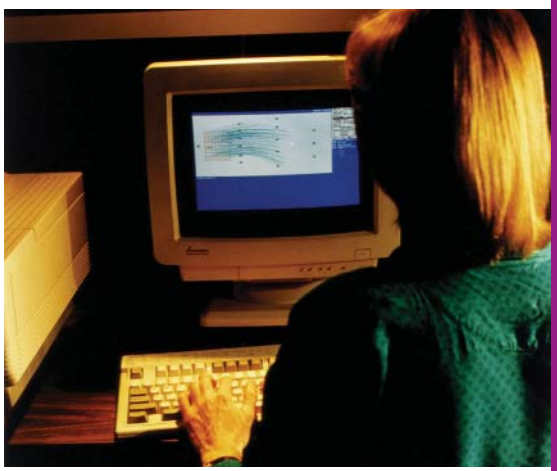
To help us understand environmental problems and support innovative approaches and solutions, research must be forward-looking. EPA's research programs support our goals for protecting and restoring communities and ecosystems by developing computational toxicology, bioinformatics, and related technologies; developing environmental and human health monitoring systems and indicators, such as the emerging Global Earth Observation System of Systems (GEOSS); and improving the utility of research results by incorporating uncertainty analysis.

Human Health Research

The research that EPA is conducting under the Human Health Research Plan (HHRP) will enable risk assessors and risk managers to reduce their reliance on default assumptions in human health risk assessment. By addressing uncertainties in risk assessment, HHRP will support a number of environmental laws, including FQPA, SDWA, and CAA; address a variety of national environmental program research priorities; and assist risk assessors, such as those associated with the Integrated Risk Information System (IRIS) and National Ambient Air Quality Standards (NAAQS).

We are also conducting research to set priorities and screen chemicals. Methods, models, and data derived from this work will help us understand the basis for differential response to chemicals at various stages in life. EPA will focus a portion of this work on assessing differential exposure and response in children and another portion on older populations. We will also emphasize the potential long-term health effects following developmental exposure to environmental agents. Extramural sources that are jointly funded by EPA and the National Institute of Environmental Health Sciences will provide research in environmental influences on neurodevelopment, asthma, and disease. Other lines of research will help us develop principles for evaluating the effectiveness of risk management decisions at the local and regional level. We will collaborate with the Centers for Disease Control and other federal agencies to accomplish this work.

Ecological Research



Under our Ecological Research Program, we will develop analytical tools to help evaluate the stressors that development and urban sprawl place on ecosystems and determine how we can efficiently control and reduce harmful effects. Improving our understanding of indicators of ecological condition and of the services ecosystems provide will

help us develop assessment tools for local decision makers. More states and tribes will be able to use a common monitoring design and appropriate indicators to determine the status of resources, trends, and program effectiveness. To inform our decision making, we must closely coordinate ecological research with environmental research, human health research, and public health, and these connections offer extensive opportunities for local partnerships.

Global Climate Change Research

Our Global Change Research Program primarily assesses the potential consequences of global change on air quality, water quality, ecosystems, and human health in the United States. It will provide scientific information about the impact of global change on specific geographic areas, as well as models for evaluating and implementing adaptation policies to protect air and water quality.

This research will support two goals of the U.S. Climate Change Science Program (CCSP): understanding the sensitivity and adaptability of different natural and managed ecosystems and human systems to climate and related global changes (CCSP Goal 4), and exploring the uses and identifying the limits of evolving knowledge to manage risks and opportunities related to climate variability and change (CCSP Goal 5).

Like the CCSP, EPA's Global Program is emphasizing improved decision making and adaptive management. Toward this end, we will develop a dynamic "decision inventory" that identifies different classes of climate-sensitive decisions in different regions of the country and evaluates the effectiveness of this scientific information in informing those decisions.

Endocrine Disruptors Research

Over the last several years, concern has grown about exposure to endocrine-disrupting, or hormonally active, chemicals. Evidence suggests that exposure to chemicals that mimic hormones (endocrine disruptors) may cause adverse health effects in wildlife and may affect human health as well.

Our endocrine disrupter research will reduce uncertainty about effects, exposure, assessment, and management of endocrine disrupters. It will help us to determine the impact that endocrine disruptors may have on humans, wildlife, and the environment and will encourage screening and testing assays. Research to understand the effects of endocrine disruptors has shifted from animal exposure testing to the relatively new field of computational toxicological research. In addition, our increasing ability to sequence the human genome has led to a rapid development of laboratory methods to assess gene expression on a genome-wide basis, and provided additional tools for endocrine disruptor research. Continued expansion of this field may also facilitate research into the effects of endocrine disruptors.

Human Health Risk Assessment Research

The Human Health Risk Assessment Program provides state-of-the-science health hazard assessment information on hazardous substances that are accorded high priority by EPA, state, and local risk assessors. This research will help us to improve the quality and objectivity of health assessments.

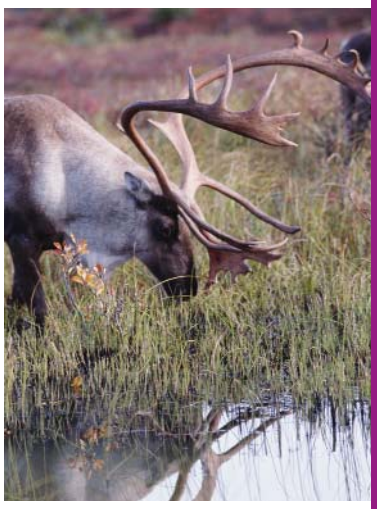
We will continue to use IRIS, the Air Quality Criteria Document (AQCD), and other assessments to support EPA's decisions. For example, we are revising AQCDs for ambient air pollutants (as mandated in the Clean Air Act) to reflect the best available scientific information on the effects on health and the environment from exposure to these pollutants, and we will incorporate this information in reviewing and promulgating NAAQS. We are working to produce more assessment information and to enhance its quality by incorporating the latest advances in risk assessment science. These activities are coordinated across EPA research and program offices through the IRIS consensus review, the Risk Assessment Forum, and other processes.

Computational Toxicology Research

Computational toxicology integrates modern computing and information technologies with molecular biology and chemistry to help set priorities for data requirements and chemical risk assessments. EPA's National Center for Computational Toxicology will generate methods, models, and data needed for better, faster, and cheaper approaches to testing chemicals and emerging technologies, such as bio- and nanotechnology. Associated research will help in assessing cumulative effects on humans from multiple exposures and in identifying and characterizing diseases resulting from changing environmental factors and factors such as pharmacological exposure. Using these tools, scientists can gain a finer understanding of the hazards and risks of a large number of chemicals. ToxCast, a forecasting tool, will provide EPA programs the ability to prioritize, screen, and assess the potential hazards of chemicals more rapidly than do current methods.

Customized DNA arrays and tools for modeling and virtual prototyping are two important research products that enable this scanning to be done efficiently and at greatly reduced expense. EPA scientists are leading this new field of environmental protection, and we will apply new capabilities gained from this research to future efforts.

Mercury Research



EPA's Mercury Research Program will provide us a better understanding of the transport and fate of mercury, from its release to its effects. The program is focusing on several key questions:

- How much of the methyl mercury in fish consumed in the United States is contributed by emissions, compared to other sources?
- How much of the mercury emissions from coal-fired utility boilers and other combustion systems can be reduced?
- What is the magnitude of mercury released from non-combustion sources?
- What risks do exposure to methyl mercury pose to wildlife species and other significant ecological receptors?
- How does exposure to environmental sources of mercury affect the health of the most susceptible human sub-populations?
- How can we most effectively inform susceptible populations about these risks?

We are also focusing research on increasing the accuracy, precision, and effectiveness of continuous emission monitors. These results will help us evaluate the effectiveness of the new Clean Air Mercury Rule. We are coordinating this research across several of EPA's programs and internationally, for example, through the United Nations Environment Program Fate and Transport Partnership.

Another high priority for the Mercury Program will be providing information to states and utilities on alternative control technologies. Researchers are also working to identify mercury deposition "hot spots" that already exist or may occur as a result of market trading of mercury emissions.

Homeland Security Research

Threat and consequence assessment research focuses on rapid evaluation of chemical, biological, and radiological risks associated with a terrorist threat or attack. This research will enable better emergency and follow-up responses by developing products for locating, collecting, and analyzing samples; protecting emergency responders, the public, and the environment; decontaminating buildings; and disposing of contaminated materials. EPA researchers will be developing and refining advisory levels for various contaminants of concern, improving risk assessment methods and communication tools, and supporting emergency and follow-up responders.

Our water infrastructure protection research will continue to focus on treatment operations; drinking water distribution systems; and, to a lesser degree, wastewater collection, treatment operations, and treated water discharge. This work involves laboratory and field testing and evaluating technologies to detect, contain, treat, and recover from intentional attacks on drinking water and wastewater facilities.

Decontamination and consequence management research will support rapid and cost-effective remediation and restoration of buildings and broad outdoor areas. This research involves laboratory and field testing and evaluation of technologies to decontaminate and dispose of materials and areas affected by intentional attacks.

We will provide the results of our homeland security research to the emergency and remedial response community, elected and appointed officials, and the general public.

Safe Pesticides and Products Research

By developing and applying the latest molecular and computational approaches, EPA's Safe Pesticides/Safe Products (SP2) Research Program will provide new tools for interpreting exposure, hazard identification, and dose-response information, strengthening our ability to develop risk assessment methods to protect birds, fish, and other wildlife. This research has become increasingly linked to advances in computational toxicology. Scientific progress in sequencing the human genome has rapidly led to laboratory methods for assessing gene expression on a genome-wide basis, which will contribute to the tools available for SP2 research.

EPA researchers will be developing methods for extrapolation among wildlife species and exposure scenarios of concern (e.g., exposure of endangered species) to advance the scientific foundation for conducting probabilistic risk assessments for wildlife populations. SP2 research will also contribute to evaluating potential ecological effects of biotechnology products, developing risk management approaches, and developing methods for assessing the potential allergenicity of genetically engineered plants.

HUMAN CAPITAL

To achieve our goals for healthy communities and ecosystems, EPA will require a workforce with a well-balanced combination of skills, experience, and expertise. We will need toxicologists with expertise in chemical testing, registration, and monitoring; biologists to evaluate the exposure impact of chemical releases on wetlands; specialized chemical engineers to reduce risks at chemical facilities; and modelers to evaluate risks of chemicals to populations and fragile ecosystems. We have also identified a gap in the number of economists, epidemiologists, human exposure modelers, and hydrologists needed to fill mission-critical scientist/researcher positions.

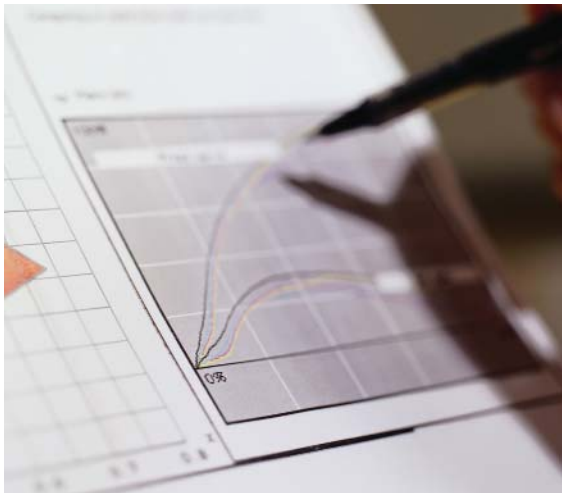
PERFORMANCE MEASUREMENT

Many of our strategic targets for protecting, sustaining, or restoring the health of people, communities, and ecosystems rely on measures or indicators of changes in the environment or human health, such as habitat and water quality conditions or blood lead levels. Collecting and analyzing these data are often expensive and time-consuming. Moreover, because changes in environmental and health conditions that result from EPA programs may not be evident for several years, it is not always practicable or useful to collect these data annually. Consequently, while these environmental and health outcome measures and data are excellent indicators of EPA's long-term performance, the Agency also uses other shorter-term measures and data to manage programs.

The Brownfields Program has developed a new strategic target for the acres of brownfields made ready for reuse. This new strategic target better represents the outcome of the Brownfields Program than the program's long-standing strategic target of brownfield properties assessed. The number of brownfield properties assessed will eventually be tracked only as an annual performance measure rather than as a strategic target.

Another new strategic target set under this goal involves human body-burden of pesticides. It embodies metrics presented as environmental indicators in EPA's forthcoming *Report on the Environment*. We have also incorporated in this *Strategic Plan* most of the long-term, outcome-oriented measures currently used in the Office of Management and Budget (OMB) Program Assessment Rating Tool (PART) assessments of various pesticide, toxics, brownfields, and geographic programs.

Measuring progress toward research goals can be challenging, not only for EPA but for science and research programs across the government. We use a number of objective measures of customer satisfaction, product impact and quality, and efficiency to assess our results. For example, we rely on expert review panel ratings on the extent to which



clients use EPA research products; surveys designed to gather data on their utility and effect, and analyses that can demonstrate actual use of EPA research products.

Improving Performance Measurement

As we considered revising and improving performance measures for this *Strategic Plan*, we also assessed longer-term opportunities for developing more results-based, outcome-oriented commitments. Under our communities and ecosystems goal, for example, we will focus collaborative research plans to better represent risks to human health and ecosystems from toxic substances and pesticides. We are working with the Board of Scientific Counselors and others to develop a means for using independent expert review to assess the success of all of our research programs. We also have identified as a priority developing a Chesapeake Bay Water Quality Index to represent the Bay's aquatic health more comprehensively.

We are also integrating environmental justice considerations under each of our *Strategic Plan* goals for the first time. In particular, we have identified eight national environmental justice priorities as deserving

of special attention.[107] While this *Strategic Plan* identifies actions and/or strategies to address these priorities, we can make further progress in developing tailored targets and measures to evaluate changes in areas with potential environmental justice concerns. Our ability to target resources and measure progress will improve as we gain experience, develop new tools, and further integrate environmental justice considerations into EPA's work. In addition to the performance measures already established, we will assess progress with respect to the following national environmental justice priorities: asthma attacks, exposure to air toxics, blood lead levels, fish and shellfish safe to eat, water safe to drink, and revitalization of brownfields and contaminated sites.

USING FEEDBACK FROM PERFORMANCE ASSESSMENTS AND PROGRAM EVALUATIONS

Programs supporting our goal of healthy communities and ecosystems are assessed in three ways: internal EPA program evaluations, including those conducted by EPA's Office of the Inspector General (OIG) and Board of Scientific Counselors (BOSC); OMB PART reviews; and external assessments by organizations such as the Government Accountability Office (GAO) and the National Academy of Sciences (NAS).

Internal Program Evaluations

The BOSC Human Health Subcommittee evaluated the Agency's Human Health Research Program's four long-term goals, which are related to the use of information in risk assessment, aggregate and cumulative risk, susceptible sub-populations, and public health outcomes. In response to BOSC recommendations, we increased

communication and collaboration among research areas, developed specific peer review goals, and articulated a decision-making process.

Several program offices are developing program-specific evaluations. For example, the Brownfields Program is reviewing headquarters and regional operations to obtain feedback on program objectives, ensure accountability, evaluate decision-making processes, and identify best practices. The review, to be completed in FY 2008, is intended to enhance program quality overall.

OIG has conducted extensive reviews of programs supporting the healthy communities and ecosystems goal. Over the past several years, OIG has:

- Assessed how well EPA has integrated environmental justice in our operations and provided recommendations for reaffirming our commitment to environmental justice and strengthening planning efforts.
- Reviewed our implementation of the Food Safety Act and provided recommendations for considering sub-populations, responding to petitions, and increasing public participation.
- Assessed implementation of the Brownfields Program and provided recommendations for managing resources and improving the grant application and selection process.

Program Assessment Rating Tool (PART)

Many of the programs supporting Goal 4 have been assessed under OMB's PART process. Summaries of all completed PART studies are available at www.whitehouse.gov/omb/expectmore/. Among the programs evaluated were:

- New Chemicals Program—rated moderately effective.
- Existing Chemicals Program—rated adequate.
- Pesticide Registration—rated adequate.
- Brownfields Revitilization—rated adequate.
- U.S.-Mexico Border Water Infrastructure—rated adequate.
- The Ecological Research Program—rated ineffective. (The program is conducting follow-up actions to address this issue.)
- Human Health Research—rated adequate.
- Endocrine Disrupting Chemicals Research—rated adequate.

External Evaluations

EPA participates with outside organizations, such as GAO and NAS, in evaluating program effectiveness and recommending improvements in program management and policies. GAO has conducted numerous evaluations of programs supporting the healthy

communities and ecosystems goal; a complete list is available at www.gao.gov/docsearch/repandtest.html. Some examples include:

- Chemical Regulation: Options Exist to Improve EPA's Ability to Assess Health Risks and Manage its Chemical Review Process (June 2005).
- Brownfield Redevelopment: Stakeholders Cite Additional Measures that Could Complement EPA's Efforts to Clean Up and Redevelop Properties (April 2005).
- Wetlands: Corps of Engineers Needs to Better Support its Decisions for Not Asserting Jurisdiction (September 2005).
- Great Lakes: Organizational Leadership and Restoration Goals Need to be Better Defined for Monitoring Restoration Progress (September 2004).
- Chesapeake Bay: Improved Strategies Are Needed to Better Assess, Report, and Manage Restoration Progress (October 2005).
- Columbia River Basin: A Multi-layered Collection of Directives and Plans Guides Federal Fish and Wildlife Activities (June 2004).

NAS has developed reports and recommendations on a range of community and ecosystem issues. For example, in 2006 NAS released "Rebuilding the Unity of Health and the Environment in Rural America" and in 2004, "Valuing Ecosystem Services: Toward Better Environmental Decision Making." EPA's risk assessment forum has also convened external reviews to evaluate programs when appropriate. The Endocrine Disruptor Chemical Research Program was evaluated in this manner.

BOSC has initiated a cycle of review for EPA's research programs and is evaluating an average of three programs each year for relevance, quality, and performance. Between 2005 and 2006, BOSC reviewed and made recommendations for improving four research plans supporting healthy community and ecosystem goals: human health, ecosystems, global climate change, and endocrine disrupting chemicals.

EMERGING ISSUES AND EXTERNAL FACTORS

Rapidly changing technologies will have significant implications for EPA's work to protect and restore communities and ecosystems. In the area of nanotechnology, for example, nanoscale materials—chemical substances containing structures on the scale of approximately 1 to 100 nanometers, or 1 to 100 billionths of a meter—will present an emerging challenge for our chemicals program. Due to their small size, nanomaterials may have different molecular properties than do other chemical substances and may present unique risks. EPA is currently reviewing pre-manufacture notices for several new nanoscale chemical substances, and we anticipate that we will soon be receiving applications to register pesticides containing nanoscale materials. (The first public inventory of nanotechnology products that have entered commercial use is available at www.nanotechproject.org/inventories).

EPA's nascent nanotechnology research program is focusing on decision support and guiding safe commercial and environmental applications. Between 2007 and 2011, our nanotechnology research will address four broad areas:

- Developing approaches to assess risk.
- Assessing risks to human health and ecosystems, particularly for applications that disperse nanomaterials.
- Assessing—from a lifecycle perspective—what impact products containing nanomaterials might have on human health and the environment and how, because of their likely durability and longer shelf life, they might conserve energy and other resources, prevent pollution, and advance sustainability.
- Identifying and developing research technologies that use nanomaterials to detect, monitor, and remediate environmental releases of conventional pollutants and nanoparticles.

We are also responding to nanotechnology with a new environmental stewardship program that will complement TSCA regulatory tools. In partnership with chemical manufacturers, processors of nanoscale materials, and other stakeholders, we will gather data to inform our risk assessment and risk reduction activities. We will use this data and information gained from strategic testing to determine whether commercial activities involving nanoscale materials present potential risks, and we will respond appropriately. EPA may also be able to provide companies with tools that will help them anticipate environmental risks and invest in safer products and production procedures.

EPA is also anticipating the use of DNA micro-arrays in environmental chemical testing. DNA micro-arrays are a type of technology that profiles the genomes of plant and animal species and uses sequences like probes to recognize substances. These technologies have the potential to change and enhance chemical testing in multiple environmental areas. EPA researchers are making significant progress in using DNA micro-arrays (gene chips) and related developments, particularly in computational toxicology.

Distributed sensor networks, another emerging technology, have the potential to enhance EPA's environmental monitoring. It is possible to envision a network of physical, chemical, and biological sensors that will

feed into a central environmental data management and analysis system, such as EPA's GEOSS. Through distributed sensor networks, we could collect and transmit data faster and more frequently, improve data quality, enhance data integration, and improve data sharing. Distributed sensor networks could also provide better environmental health information that allows us to measure progress at multiple temporal and spatial scales. This technology could support our *Report on the Environment*, advance our foresight capabilities, and provide data that accurately portrays environmental conditions on a real-time basis.

Renewable energy and fuel sources such as biofuels could have many implications for EPA. We will need to examine how producing new renewable and non-renewable forms of energy and the infrastructure for distributing and storing them might affect the environment. For example, the use of pesticides and loss of habitat that attend production of biofuels can potentially affect human health and the environment. We will also need to characterize the potential for emissions generated from producing and using biofuels.

Global climate change, loss of habitat to sprawl, exploitation of natural resources, invasive species, nonpoint source pollution, and the accumulation and interaction of these conditions represent emerging ecological challenges. Our ability to achieve our strategic objectives depends on a number of factors over which we have little or no influence. The success of partnerships, international collaboration, and efforts at global harmonization; economic influences (including increased trade and foreign investment); industrial accidents; natural disasters; litigation; and new legislation all can affect our progress in achieving our goals.

To learn more go to: www.epa.gov/ocfo/futures/perspectives.htm.

Notes:

1. For information on EPA's National Land Cover Database, see U.S. EPA, Landscape Ecology Study Areas internet site: www.epa.gov/nerlesd1/land-sci/. Las Vegas, NV: Office of Research and Development. See also U.S. Department of the Interior, Multi-Resolution Land Characteristics Consortium internet site: www.mrlc.gov/. Sioux Falls, SD: U.S. Geological Survey. Also see U.S. Department of the Interior, Earth Resources Observation and Science (EROS), Global Land Cover Characterization internet site: edcsns17.cr.usgs.gov/glcc/. U.S. Geological Survey (updated June 27, 2005). For information on EPA's Environmental Monitoring and Assessment Program, see U.S. EPA, *Environmental Monitoring and Assessment Program* (EMAP) internet site: www.epa.gov/emap/. For information on *EPA's Report on the Environment*, see U.S. EPA *Report on the Environment* internet site: www.epa.gov/indicators/index.htm. Washington, DC.
2. Measurement Mechanism: EPA risk management action tracking tools, including RAPIDS (not publicly available) and HPVIS. See U.S. EPA, High Production Volume Information System (HPVIS) internet site: http://epa.gov/hpvis/. Washington, DC: Office of Prevention, Pesticides and Toxic Substances. Once HPV challenge chemicals have been through the EPA multi-tier risk assessment process, any found to present unreasonable risks under the Toxics Substance Control Act is tracked for action, such as Significant New Use Rules (SNURs) that bind all manufacturers and processors to terms and conditions that prevent unreasonable risks, other regulatory action, guidance, referral to other Agency statutes, etc.
3. Measurement Mechanism: Number of TSCA 8(e) Chemical Hazard Notifications associated with Pre-manufacture notice (PMN)-reviewed chemicals verified to identify the occurrence of unreasonable risks. Starting in FY 2005, EPA expanded its assessment of incoming TSCA 8(e) reports, required to be submitted whenever companies learn of "substantial risks" to determine whether EPA properly identified those potential hazards/risks in previously reviewed PMNs. The results of this new assessment process enables the program to identify potential flaws in its PMN review protocols and act quickly to make associated improvements.
4. Target assumes annual 3.0% reductions for remaining years through 2011. Measurement Mechanism: EPA's Risk Screening Environmental Indicators (RSEI) model. See U.S. EPA Risk Screening Environmental Indicators (RSEI) internet site: www.epa.gov/opptintr/rsei/. Washington, DC: Office of Prevention, Pesticides and Toxic Substances.
5. Centers for Disease Control and Prevention. 2005. Blood Lead Levels-United States, 1999-2002, MMWR: 54(2): 513-516. Available online at: www.cdc.gov/mmwr/PDF/wk/mm5420.pdf.
6. Centers for Disease Control and Prevention. 1994. Update: Blood Lead Levels--United States, 1991-1994. MMWR: 43(30): 545-548. Available online at: www.cdc.gov/mmwr/preview/mmwrhtml/00032080.htm.
7. United Nations Environment Program and the Partnership for Clean Fuels and Vehicles maintain a global database on fuel quality, which is updated periodically. See United Nations, Partnership for Clean Fuels and Vehicles internet site: http://webapps01.un.org/dsd/partnerships/public/partnerships/178.html#top. New York, NY: Division for Sustainable Development, Department of Economic and Social Affairs.

8. Ibid.

9. The baseline for this strategic target is derived by totaling the vulnerability zones around individual RMP facilities. In many instances, a facility's vulnerability zone overlaps with the vulnerability zones of other facilities. Consequently, the baseline for this measure exceeds the spatial extent of vulnerable areas, but accurately reflects cumulative progress in reducing potential sources of risk.

10. This strategic target is based on the levels of several key pesticides found in people as measured by the Centers for Disease Control's bi-annual National Health and Nutrition Examination Survey (NHANES) (1999-2002). Center for Disease Control had collected these data for sufficient time to establish a meaningful baseline. The target provides an indicator of the body burden in the general population resulting from pesticide exposure. See www.cdc.gov/nchs/nhanes.htm.

11. The term "risk events" is based on the assumption that every pesticide application has the potential to create a pesticide incident with adverse health effects. The number of pesticide applications was derived by taking the universe of occupationally exposed individuals and estimating the number of pesticide applications per individual per year. Data sources: EPA's annual count of certified applicators; U.S. Department of Labor. March 2005. *Findings from the National Agricultural Workers Survey (NAWS) 2001 - 2002. A Demographic and Employment Profile of United States Farm Workers*, Research Report No. 9., Washington, DC: Office of the Assistant Secretary for Policy, Office of Programmatic Policy (available online at: www.doleta.gov/agworker/naws.cfm) and; American Association of Poison Control Centers' Toxic Exposure Surveillance System: www.aapcc.org/poison1.htm.

12. American Association of Poison Control Centers' Toxic Exposure Surveillance System: www.aapcc.org/poison1.htm.

13. USGS National Water-Quality Assessment (NAWQA) program, as reported in Gilliom, R. J., J. E. Barbash, et al. 2006. *The Quality of Our Nation's Waters: Pesticides in the Nation's Streams and Ground Water, 1992–2001.* Reston, Virginia: U.S. Geological Survey, Circular 1291: 172 p. Available online at: http://pubs.usgs.gov/circ/2005/1291/.

14. Annual Report of the Interregional Research Project No. 4 (IR-4Project) (NRSP-4/IR-4): January 1, 2005-December 31, 2005: http://ir4.rutgers.edu/Other/annreports.html.

15. EPA's estimate of annual termite structural damage avoided is derived from an estimated $2,500 average termite damage per house, 3,620,000 units receiving termite treatment, and an estimate that 10 percent of housing units would have received termite damage absent the treatment ($2,500 x 3,620,000 units = $9.05 billion x 0.1 = $9.05 million/year termite structural damage avoided.)

16. Toxic Substances Control Act Section 5: Manufacturing and Processing Notices, *Public Law* 94-469, October 11, 1976.

17. U.S. EPA, High Production Volume (HPV) Challenge Program internet site: www.epa.gov/chemrtk/. Washington, DC: Office of Prevention, Pesticides, and Toxic Substances (updated April 20, 2006).

18. U.S. EPA, High Production Volume Information System (HPVIS) internet site: www.epa.gov/hpvis/index.html. Washington, DC: Office of Prevention, Pesticides and Toxic Substances.

19. Organisation for Economic Co-operation and Development, Co-operation on the Investigation of Existing Chemicals, Description of OECD Work on Investigation of High Production Volume Chemicals internet site: www.oecd.org/document/21/0,2340,en_2649_34379_1939669_1_1_1_1,00.html. See also Global HPV Portal and existing databases internet site: www.oecd.org/document/9/0,2340,en_2649_34379_35211849_1_1_1_1,00.html. Also see United Nations Environmental Program, Chemical Screening Information Data Set (SIDS) for High Volume Chemicals internet site: www.chem.unep.ch/irptc/sids/OECDSIDS/sidspub.html.

20. Advanced tools developed under the NCP include QSAR - Quantitative Structure Activity Relationships. There is no defined base data set required before PMN, and the TSCA does not require prior testing of new chemicals. Consequently, less than half of the PMNs submitted include toxicological data. In these cases, EPA scientists assess the chemical's structural similarity to chemicals for which data are available—called structure-activity relationship (SAR)–to help predict toxicity. A useful discussion of SAR is found in an OECD monograph, *US EPA/EC Joint Project on the Evaluation of (Quantitative) Structure Activity Relationships*, Environment Monograph No. 88, Organisation for Economic Co-Operation and Development, Paris, 1994. Available online at: www.epa.gov/opptintr/newchems/pubs/ene4147.pdf.

The Ecological Structure Activity Relationships (ECOSAR) is a personal computer software program used to estimate the aquatic toxicity of chemicals. The program predicts the toxicity of industrial chemicals to aquatic organisms such as fish, invertebrates, and algae using (Q)SARs. ECOSAR estimates a chemical's acute (short-term) toxicity and, when available, chronic (long-term or delayed) toxicity. ECOSAR is available on the internet at U.S. EPA, Pollution Prevention (P2) Framework, Hazard Models internet site: www.epa.gov/oppt/p2framework/docs/hazard.htm#Sub2. Washington, DC: Office of Pollution Prevention and Toxics (updated June 1, 2006).

21. U.S. EPA, Sustainable Futures. 67 Federal Register 76282. December 11, 2002, Washington, DC: Office of Pollution Prevention and Toxics. Available online at: www.epa.gov/oppt/newchems/pubs/sustainablefutures.htm.
22. For relevant studies, see citations in U.S. EPA. 2005. *Draft Risk Assessment of the Potential Human Health Effects Associated with Exposure to Perfluorooctanoic Acid and its Salts*. Washington, DC, Office of Pollution Prevention and Toxics, Risk Assessment Division. Available online at: www.epa.gov/opptintr/pfoa/pubs/pfoarisk.htm.
23. U.S. EPA, RMP Program Overview internet site: http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/RMPoverview.htm. Washington, DC: Office of Emergency Management.
24. U.S. EPA, EPCRA Overview internet site: http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/epcraOverview.htm. Washington, DC: Office of Emergency Management.
25. U.S. EPA, Acute Exposure Guideline Levels Program internet site: www.epa.gov/opptintr/aegl/. Washington, DC: Office of Prevention, Pesticides and Toxic Substances.
26. U.S. EPA, Pesticides internet site: www.epa.gov/pesticides/. Washington, DC: Office of Pesticide Programs (updated June 1, 2006).
27. U.S. EPA, Pesticides: Topical & Chemical Fact Sheets, Pesticide Registration Program internet site: www.epa.gov/pesticides/factsheets/registration.htm (updated May 2, 2006).
28. U.S. EPA, Pesticide Tolerance Reassessment and Reregistration internet site: www.epa.gov/pesticides/reregistration.
29. See U.S. EPA, Pesticides: Health and Safety, Reducing Pesticide Risk internet site: www.epa.gov/pesticides/health/reducing.htm.
30. U.S. Department of Labor. March 2005. *Findings from the National Agricultural Workers Survey (NAWS) 2001 - 2002. A Demographic and Employment Profile of United States Farm Workers*, Research Report No. 9, Washington, DC: Office of the Assistant Secretary for Policy, Office of Programmatic Policy. Available online at: www.doleta.gov/agworker/naws.cfm.
31. The Endangered Species Act of 1973 sections 7(a)1 and 7(a)2; Federal Agency Actions and Consultations, as amended (16 U.S.C. 1536(a)). Available at U.S. Fish and Wildlife Service, Endangered Species Act of 1973 internet site: www.fws.gov/endangered/esa.html#Lnk07.
32. Federal Insecticide, Fungicide, and Rodenticide Act, as amended. January 23, 2004. Section 3(a), Requirement of Registration (7 U.S.C. 136a). Available online at: www.epa.gov/opp00001/regulating/fifra.pdf.
33. Gilliom, R.J., et al. 2006. *The Quality of Our Nation's Waters: Pesticides in the Nation's Streams and Ground Water*, 1992–2001. Reston, Virginia: U.S. Geological Survey Circular 1291. 171p. Available online at: http://pubs.usgs.gov/circ/2005/1291/.
34. Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536(a)(2)). Available at U.S. Fish and Wildlife Service, Endangered Species Act of 1973 internet site: www.fws.gov/endangered/esa.html#Lnk07.
35. U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration 2004. Joint Counterpart Endangered Species Act Section 7 Consultation Regulations, 50 CFR Part 402. Available online at: http://endangered.fws.gov/consultations/pesticides/Final_Rule.pdf.
36. Community-specific baselines for criteria air pollutants, land consumption, and storm water run-off to EPA assistance prior will be compared to environmental impacts from community actions affecting growth and development, as predicted in computer-modeled alternative future development scenarios within each

community and validated by actual environmental measurements and indicators. EPA uses a customized version of Criterion's proprietary INDEX computer model for developing community development and growth scenarios and assessing their impacts and impacts avoided. See Criterion Planners Inc. (2006). Smart Growth INDEX. Portland, OR: www.crit.com.

37. The term "significant" is used in a manner analogous to its use under the National Environmental Policy Act, involving considerations of both "context" and "intensity." See 40 CFR 1508.27. Under this definition, "…in the [context] of a site-specific action, significance would usually depend upon the effects in the locale... Both short- and long-term effects are relevant." With respect to intensity, issues such as the magnitude of the impact (positive and negative) will be considered.

38. U.S. EPA, Environmental Data Registry, Assessment, Cleanup, Redevelopment, Exchange System internet at: http://iaspub.epa.gov/ed/edr_proc_qry.navigate?P_LIST_OPTION_CD=CSALL&P_REG_AUTH_IDENTIFIED=1&P _DATA_IDENTIFIED=97509&P_VERSION=1.

39. Census estimate of homes lacking access minus homes provided with access between 2000 and 2003.

40. 2000 Census estimate of homes lacking access to adequate wastewater sanitation minus homes provided with access between 2000 and 2003.

41. These initial baselines were calculated from Arctic Monitoring and Assessment Programme data that includes human health data points from indigenous maternal populations across the Arctic, including Alaska, Canada, Norway, and the Russian Federation. Measurement Mechanism: Assessment of data from AMAP, an existing international scientific working group, which advises governments of the eight Arctic countries on issues related to pollution in the Arctic. AMAP data is presented in periodic scientifically-based assessments, which are a result of cooperative efforts involving a large number of scientists and other stakeholders, who follow agreed quality assurance and control protocols consistent with such practices common in the United States. For summary of source data, see AMAP, 2002. Arctic Pollution 2002 (Persistent Organic Pollutants, Heavy Metals, Radioactivity, Human Health, Changing Pathways). Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway. xii+112 pp. See also Persistent Toxic Substances, Food Security and Indigenous Peoples of the Russian North. Final Report. Arctic Monitoring and Assessment Programme (AMAP), Oslo, 2004. 192 p. AMAP Report 2004:2. Documents are available on the AMAP internet site: www.amap.no/.

42. U.S. EPA, Community Action for a Renewed Environment (CARE) program internet site: http://cfpub.epa.gov/care/.

43. Clinton, William J. February 16, 1994. Federal actions to address environmental justice in minority populations and low-income populations. Executive Order 12898, 59 FR 7629. Available online at: www.archives.gov/federal-register/executive-orders/1994.html#12898.

44. Small Business Liability Relief and Brownfields Revitalization Act (Public Law 107-118 (H.R. 2869), 115 stat. 2356). Available online at: www.epa.gov/swerosps/bf/sblrbra.htm#status.

45. Brownfields and Land Revitalization Technology Support Center internet site: www.brownfieldstsc.org/. U.S. EPA's Office of Superfund Remediation and Technology Innovation, U.S. Army Corps of Engineers, and Argonne National Laboratory.

46. Triad Resource Center internet site: www.triadcentral.org/. Triad is an innovative approach to decision making for hazardous waste site characterization and remediation. The Triad approach proactively exploits new characterization and treatment tools. The Triad Resource Center provides the information hazardous waste site managers and cleanup practitioners need to implement the Triad effectively. The U.S. EPA, U.S. Army Corps of Engineers, U.S. Army, U.S. Navy, Argonne National Laboratory, State of New Jersey Department of Environmental Protection, and the Interstate Technology Regulatory Council support Triad.

47. SMARTe (Sustainable Management Approaches and Revitalization Tools) internet site: www.smarte.org/smarte/home/index.xml. SMARTe is an open-source, web-based, decision support system for developing and evaluating future reuse scenarios for potentially contaminated land. SMARTe contains guidance and analysis tools for all aspects of the revitalization process including planning, environmental, economic, and social concerns. The U.S. EPA's Office of Research and Development and Office of Brownfields Cleanup and Redevelopment, the German Federal Ministry of Education and Research, and the Interstate Technology Regulatory Council support its development.

48. U.S. EPA, U.S.-Mexico Border Program, Border 2012 Program internet site: www.epa.gov/usmexicoborder/.

49. Stockholm Convention on Persistent Organic Pollutants. Signed by USA on May 23, 2001. Entered into force on 17 May 2004. See www.pops.int/. See also www.epa.gov/oppfead1/international/pops.htm.

50. Arctic Monitoring and Assessment Programme internet site: www.amap.no/.

51. Arctic Council, www.arctic-council.org under "Activities" (ACAP/Obsolete Pesticides Project).

52. Arctic Council, www.arctic-council.org under "Activities" (ACAP/PCB Project).

53. U.S. DOI, U.S. Fish and Wildlife Service, 2006. Status and Trends of Wetlands in the Coterminous United States 1998-2004, Washington, DC, 55 pp.

54. Data for the index components are tracked internally by U.S. EPA's Great Lakes National Program Office and reported through the State of the Lakes Ecosystem Conference (SOLEC) process. The document, *State of the Great Lakes 2005—A Technical Report*, presents detailed indicator reports prepared by primary authors, including listings of data sources.

55. U.S. EPA, Great Lakes Monitoring, Contaminants in Top Predator Fish internet site: www.epa.gov/glnpo/glindicators/fishtoxics/topfishb.html.

56. Data are collected through the Integrated Atmospheric Deposition Network (IADN). See U.S. EPA, Great Lakes Monitoring, Atmospheric Deposition of Toxic Pollutants internet site: www.epa.gov/glnpo/glindicators/air/airb.html.

57. U.S. EPA, Areas of Concern (AoCs) On-line, Great Lakes internet site: www.epa.gov/glnpo/aoc/index.html. Chicago, Illinois: Great Lakes National Program Office.

58. U.S. EPA, Sediment Remediation, Great Lakes internet site: www.epa.gov/glnpo/glindicators/sediments/remediateb.html. Chicago, Illinois: Great Lakes National Program Office.

59. Batiuk, R., et al. April 2003. Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for Chesapeake Bay and Its Tidal Tributaries, Annapolis, Maryland: U.S. EPA, Region 3, Chesapeake Bay Program Office: www.chesapeakebay.net/maycriteria.htm.

60. Ibid.

61. Koroncai, R., et al. December 2003, Setting and Allocating the Chesapeake Bay Basin Nutrient and Sediment Loads: The Collaborative Process, Technical Tools, and Innovative Approaches. Annapolis, Maryland: U.S. EPA, Region 3, Chesapeake Bay Program Office: www.chesapeake bay.net/caploads.htm.

62. Ibid.

63. Ibid.

64. U.S. EPA, Surf Your Watershed, 2002 Section 303(d) List Fact Sheets for Florida (http://oaspub.epa.gov/waters/state_rept.control?p_state=FL), Alabama (http://oaspub.epa.gov/waters/state_rept.control?p_state=AL), Mississippi (http://oaspub.epa.gov/waters/state_rept.control?p_state=MS, Louisiana (http://oaspub.epa.gov/waters/state_rept.control?p_state=LA), and Texas (http://oaspub.epa.gov/waters/state_rept.control?p_state=TX).

    Also see U.S. EPA, Watershed Assessment, Tracking and Environmental Results (WATERS), WATERS Expert Query Tool: http://iaspub.epa.gov/waters/ez_column.list?table_name=V_WO_IMPAIRMENTS_LIST. Also see U.S. EPA, Region 4 Alabama's and Mississippi's 2002 303(d) List Review Decision Document and Florida's 2003 303(d) List Decision; U.S. EPA, Region 6. Louisiana's 2002 Section 303(d) List of Water Quality Limited Water Bodies and Review of Texas' 2002 Section 303(d) Water Body List. Sources for geospatial data are 303(d) mapping by Florida Department of Environmental Protection, Alabama Department of Environmental Management, Mississippi Department of Environmental Quality, Louisiana Department of Environmental Quality, and Texas Commission on Environmental Quality.

65. LaRoe, E.T., G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac, eds. 1995. Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems. U.S. DOI, National Biological Service, Washington, DC; 530 pp. Available online at: http://biology.usgs.gov/s+t/index.htm.

66. LUMCON News. July 28, 2006. LUMCON Researchers Report Current Hypoxic Zone at Over 6,600 Square Miles: www.lumcon.edu/Information/news/default.asp?XMLFilename=200607281358 Shelfwide06PressRelease.xm:1; Hypoxia in the Northern Gulf of Mexico: www.gulfhypoxia.net/shelfwide06/; Chauvin, LA: Louisiana Universities Marine Consortium (LUMCON). Also see NOAA, July 24, 2006. NOAA Forecasts Larger than Normal "Dead Zone" for Gulf this Summer. NOAA Magazine. Washington, DC: NOAA Public, Constituent & Intergovernmental Affairs: www.noanews.noaa.gov/stories2006/s2669.htm.

67. Connecticut Department of Environmental Protection and New York State Department of Environmental Protection. December 2000. A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound: www.longislandsoundstudy.net/pubs/reports/tmdl.pdf.

68. Connecticut Department of Environmental Protection, Long Island Sound Water Quality Monitoring: http://dep.state.ct.us/wtr/lis/monitoring/lis_page.htm.

69. Long Island Sound Study, Sound Health 2006 Environmental Indicators: www.longislandsoundstudy.net/indicators/index.htm on Water Quality/Water Quality Measures. Stamford, CT: EPA Long Island Sound Office.

70. Long Island Sound Study, Sound Health 2006 Environmental Indicators: www.longislandsoundstudy.net/indicators/index.htm on Habitat Protection/River Miles Restored and Coastal Habitat Restored. Stamford, CT: EPA Long Island Sound Office.

71. U. S. EPA, Florida Fish and Wildlife Conservation Commission, NOAA, Coral Reef Evaluation and Monitoring Project (CREMP), Florida Keys National Marine Sanctuary Water Quality Protection Program: http://ocean.floridamarine.org/fknms_wqpp/pages/cremp.html.

72. Florida International University, Southeast Environmental Research Center, Seagrass Ecosystems Research Laboratory: www.fiu.edu/~seagrass.

73. Florida International University, Southeast Environmental Research Center, Water Quality Monitoring Network: www.serc.fiu.edu/wqmnetwork.

74. U.S. EPA, Ecoregional Criteria, Nutrient Water Quality Criteria: www.epa.gov/waterscience/criteria/nutrient/ecoregions/. Florida Department of Environmental Protection. July 2, 2006. Calculation of Annual and 5-Year Geometric Mean Total Phosphorus Concentrations to Assess Achievement of the Phosphorus Criteria for the Everglades Protection Area.

75. Puget Sound Assessment and Monitoring Program Update. Puget Sound Action Team and Washington Department of Health, 2006: www.doh.wa/gov/ehp/sf/sfpubs.htm#GrowingAreasPubs.

76. U.S. EPA, Region 10, Superfund Site Inventory for Puget Sound, internal database.

77. Puget Sound Nearshore Restoration Site Inventory, Washington Interagency Committee for Outdoor Recreation, project-tracking database, August 2006.

78. Baseline data will be based on Washington State input to the National Emissions Inventory Database.

79. The development of baselines for contaminants of concern found in water and fish tissue will include the following sources: (1) Hood River Watershed, DEQ 2006, Mill Creek Watershed, DEQ 2006, Walla Walla Watershed, DEQ 2006 (pending), Pudding River Watershed, DEQ 2006 (pending), and Clackamas River, Watershed DEQ 2006 (pending). These reports which are found in hard copy will be put on the EPA Columbia River website (as a part of the baseline information), which is currently under development. (2) Water Cleanup Plans (TMDLs) by Watershed/Ecology Region, www.ecy.wa.gov/programs/wq/tmdl/watershed/index.html (updated April 2005); Yakima River Pesticide TMDL, Okanogan River DDT and PCB TMDL, Wenatchee River, Mission Creek, and Lake Chelan PCB and Pesticide TMDL, Walla Walla Pesticide and PCB TMDL, and Palouse River Pesticide and PCB TMDL. (3) U.S. EPA. 2002. *Columbia River Basin Fish Contaminant Survey: 1996-1998* (EPA, 910-R-02-006). Seattle, Washington: Region 10, Risk Evaluation Unit: http://yosemite.epa.gov/R10/OEA.NSF/af6d4571f3e2b1698825650f0071180a/c3a9164ed269353788256c09005d36b7?OpenDocument. (4) Fixed Station and Seasonal Monitoring of Conventional and Toxic Contaminants on the Lower Columbia River Estuary Partnership (LCREP) Internet site: www.lcrep.org/eco_water_qual.htm#fixed. (5) Johnson, A. and D. Norton. March 2005. *Concentrations of 303(d) Listed Pesticides, PCBs, and PAHs Measured with Passive Samplers Deployed in the Lower Columbia River,* Ecology Publication No. 05-03-006. Olympia WA., Washington State Department of Ecology: www.ecy.wa.gov/pubs/0503006.pdf.

80. Dahl, T.E. 1990. *Wetlands Losses in the United States, 1780s to 1980s*. Washington, DC: U.S. Department of the Interior, U.S. Fish and Wildlife Service. Available online at: www.npwrc.usgs.gov/resource/othrdata/wetloss/wetloss.htm.

81. Dahl, T.E. 2006. *Status and Trends of Wetlands in the Conterminous United States, 1998 to 2004*. Washington, DC: U.S. Department of the Interior, U.S. Fish and Wildlife Service, 112 pp. Available at Fish and Wildlife Service, National Wetlands Inventory internet site: www.fws.gov/nwi/.

82. Bush, George W. April 22, 2004. Announcement of Wetlands Initiative on Earth Day. Wells National Estuarine Research Reserve, Wells, Maine. Available at Council on Environmental Quality, Expanding and Protecting America's Wetlands internet site: www.whitehouse.gov/ceq/clean-water.html#2.

83. Council on Environmental Quality. April 2006. *Conserving America's Wetlands 2006: Two Years of Progress Implementing the President's Goal*. Available online at: www.whitehouse.gov/ceq/wetlands_200604.pdf.

84. Compensatory Mitigation Rulemaking web page: www.epa.gov/wetlandsmitigation.

85. U.S. EPA, Five Star Restoration Program internet site: www.epa.gov/owow/wetlands/restore/5star/. Washington, DC: Office Wetlands, Oceans, and Watersheds.

86. U.S. EPA, Regional Geographic Initiatives internet site: www.epa.gov/regional/rgi.htm. Washington, DC: Office of Regional Operations.

87. U.S. EPA, Targeted Watershed Grants Program internet site: www.epa.gov/owow/watershed/initiative/. Washington, DC: Office Wetlands, Oceans, and Watersheds.

88. U.S. EPA, Polluted Runoff (Nonpoint Source Pollution), Clean Water Act Section 319 internet site: www.epa.gov/OWOW/NPS/cwact.html. Washington, DC: Office Wetlands, Oceans, and Watersheds.

89. Beach, Dana. 2002. *Coastal Sprawl: The Effects of Urban Design on Aquatic Ecosystems in the United States*. Arlington, VA: Pew Oceans Commission. Available online at: www.pewtrusts.org/ideas/ideas_item.cfm?content_item_id=1023&content_type_id=8.

90. Bush, George W. May 18, 2004: Executive Order: Establishment of Great Lakes Interagency Task Force and Promotion of a Regional Collaboration of National Significance for the Great Lakes. Executive Order 13340. Available at: www.whitehouse.gov/news/releases/2004/05/20040518-3.html

91. U.S. EPA, Great Lakes, Regional Collaboration: Interagency Task Force internet sites: www.epa.gov/grtlakes/collaboration/taskforce/index.html.

92. U.S. EPA, Great Lakes Regional Collaboration: Making the Great Lakes Greater internet site: www.epa.gov/grtlakes/collaboration/index.html. See also: Bush, George W. May 18, 2004. Executive Order: Establishment of Great Lakes Interagency Task Force and promotion of a regional collaboration of national significance for the Great Lakes. Washington, DC. Available online at: www.epa.gov/grtlakes/collaboration/taskforce/eo.html.

93. Great Lakes Regional Collaboration internet site: www.glrc.us/. See also *Great Lakes Regional Collaboration Strategy to Restore and Protect the Great Lakes*. December 2005. Chicago, IL: Great Lakes Regional Collaboration. Available online at: www.glrc.us/strategy.html.

94. U.S. EPA, Great Lakes Pollution Prevention and Toxics Reduction, Great Lakes Binational Toxics Strategy internet site: www.epa.gov/glnpo/bns/index.html.

95. U.S. EPA, Chesapeake Bay Program. June 2000. *Chesapeake 2000 Agreement*. Annapolis, Maryland. Available online at: http://chesapeakebay.net/pubs/chesapeake2000agreement.pdf.

96. Koroncai, R., et al. December 2003. *Setting and Allocating the Chesapeake Bay Basin Nutrient and Sediment Loads: The Collaborative Process, Technical Tools, and Innovative Approaches*. Annapolis, Maryland: U.S. EPA, Region 3, Chesapeake Bay Program Office: www.chesapeakebay.net/caploads.htm.

97. U.S. EPA, Gulf of Mexico Program internet site: www.epa.gov/gmpo.

98. The Gulf of Mexico Alliance internet site: www.dep.state.fl.us/gulf/. Tallahassee, Florida: Florida Department of Environmental Protection.

99. Federal Workgroup, the U.S. Ocean Action Plan's Gulf of Mexico Regional Partnership internet site: www2.nos.noaa.gov/gomex.

100. Gulf of Mexico Alliance. 2006. *Governors' Action Plan for Healthy and Resilient Coasts: March 2006-March 2009*. Available online at: www.dep.state.fl.us/gulf/files/files/GulfActionPlan_Final.pdf.

101. Long Island Sound Study (LISS) internet site: www.longislandsoundstudy.net. Also see *Comprehensive Conservation and Management Plan for Long Island Sound*. March 1994: www.longislandsoundstudy.net/mgmtplan.htm. Stamford, CT: EPA Long Island Sound Office.

102. Moore, R.E., M.S. Overton, R.J. Norwood, and D. DeRose. 2000. *Nitrogen Credit Trading for Long Island Sound Watershed*. Water Environment Research Foundation Project RFP-97-IRM-5B. Alexandria, VA: Water Environment Research Foundation.

103. Long Island Sound Study, Long Island Sound 2003 Agreement internet site: www.longislandsoundstudy.net/ccmp/liss_agreement_03.htm. Stamford, CT: EPA Long Island Sound Office.

104. U.S. EPA, Region 4: South Florida Geographic Initiative internet site: www.epa.gov/region4/water/southflorida/.

105. U.S. EPA. 2002. *Columbia River Basin Fish Contaminant Survey:1996-1998* (EPA, 910-R-02-006). Seattle, Washington, U.S. EPA Region 10, Risk Evaluation Unit: http://yosemite.epa.gov/R10/OEA.NSF/af6d4571f3e2b1698825650f0071180a/c3a9164ed269353788256c09005d36b7?OpenDocument. Also see Fixed Station and Seasonal Monitoring of Conventional and Toxic Contaminants on the Lower Columbia River Estuary Partnership (LCREP) internet site: www.lcrep.org/eco_water_qual.htm#fixed. Also see Johnson, A. and D. Norton. March 2005. *Concentrations of 303(d) Listed Pesticides, PCBs, and PAHs Measured with Passive Samplers Deployed in the Lower Columbia River,* Ecology Publication No. 05-03-006. Olympia WA: Washington State Department of Ecology. www.ecy.wa.gov/pubs/0503006.pdf.

106. U.S. EPA *Report on the Environment* internet site: www.epa.gov/indicators/index.htm.

107. On November 5, 2005, EPA Administrator Stephen L. Johnson established eight national environmental justice priorities in a memorandum, "Reaffirming the U.S. Environmental Protection Agency's Commitment to Environmental Justice." The memorandum is available online at www.epa.gov/compliance/resources/policies/ej/admin-ej-commit-letter-110305.pdf . The national environmental justice priorities include: (1) Reduce asthma attacks; (2) Fish and shellfish safe to eat; (3) Reduce exposure to air toxics; (4) Water safe to drink; (5) Reduced incidence of elevated blood lead levels; (6) Collaborative problem-solving; (7) Ensure compliance; and (8) Revitalization of brownfields and contaminated sites.