

Index

- adaptation to climate change
 - agricultural, 6, 13, 18-19, 44-46 [I/II]; 276-277, 286-328 [I]
 - anticipatory actions, 3 [I/II]
 - choosing strategies, 15-16 [I/II]
 - coastal areas, 6, 18, 40 [I/II]; 154-204 [I]
 - communication of risk and, 25-26 [I/II]
 - contingency **planning**, 26-27
 - defined**, 2-3 [I/II]
 - flexibility** in policy making, 16-17, 18 [I/II]
 - forests, 6, 15, 19, 23, 55 [I/II]; 320-330, 347-349 [II]
 - fragmentation, 19, 23, 25
 - historical examples**, 298-300 [I]
 - managed** vs. unmanaged systems, 102-103 [I/II]
 - photoperiod and, 87 [I/II]; 287, 299, 303 [I]
 - preserves, 19, 53 [I/II]; 235-238, 244-250, 258-268, 276-277, 279-291 [II]
 - rate of change and, 4 [I/II]
 - research, 16-17, 23, 27, 30, 35, 111, 132-139, 147-148 [I/II]
 - species adjustments, 91-95 [I/II]; 179-181 [II]
 - water resources systems, 6, 18, 42 [I/II]; 232-235 [I]
 - wetlands**, 12, 111 ~/II; 172-185 [II]
- agriculture
 - adaptability, 6, 13, 18-19, 44-46 [I/II]; 276-277, 286-328 [I]
 - biotechnology applications, 284, 306-307, 315, 323, 325 [I]
 - climate change effects, 5, 13, 15, 45 [I/II]; 286-296 [I]
 - commodity support programs, 17, 19, 45, 46 [I/II]; 276, 297, 310, 311-312, 317-319, 326, 327 [I]
 - competition for world markets, 284 [I]
 - crop insurance, 21, 26, 33, 36-37, 45 [I/II]; 254-255, 312-313, 320, 321, 328 [I]
 - cropping systems, 46 [I/II]; 287, 308-309 [I]
 - disaster assistance, 19, 26, 36-37, 45-47 [I/II]; 276, 310, 312-313, 319-322, 326-328 [I]
 - domestic demand, 282 [I]
 - drought and, 13, 45 [I/II]; 288, 293, 304-305 @J
 - dryland, 33 [I/II]; 218, 291, 296, 299 [I]
 - economic issues, 276, 277-278, 280, 288, 291, 292 [I]
 - environmental concerns, 284, 289, 292, 294-2% [I]
 - farm structural changes, 286, 304-305 [I]
 - Federal programs, 278-280, 284 [I]
 - fertilizers, 88 [I/II]; 219, 307 [I]
 - growing season, 13, 33 [I/II]; 287, 303 [I]
 - information and management technologies, 46 [I/II]; 284, 305, 307-308, 323-328 [I]
 - institutional setting, 310-316 [I]
 - intensive farming practices, 33, 46, 87-88 [I/II]; 304 [I]
 - legislation, 46-47 [I/II]; 278-279, 311, 312, 318, 321 [I]
 - microclimate modification**, 303 [I]
 - policy options, 46-47 [I/II]; 316-328 [I]
 - in prairie pothole region, 26, 33-34 [I/II]
 - regions of United States., 281, 283 [I]
 - research and extension, 16-17, 22, 26, 35, 46, 133, 135 [I/II]; 279, 297, 299, 305, 308, 309, 310, 317, 323-324, 326 [I]
 - salinization** problems, 259, 284, 294-296, 297 [I]
 - Sodbuster Program, 284 [I]
 - soil conservation, 278, 279, 301, 310, 322, 324 [I]
 - soil moisture and, 10, 11 [I/II]; 303 [I]
 - subsidies, 17, 19 [I/II]; 192, 297, 310, 312-313, 318, 320 [I]
 - Swampbuster Program, 284 [I]; 192-194, 201 [II]
 - technologies, 45, 46 [I/II]; 297-309 [I]
 - trends, 281-286 [I]
 - water demand and supply, 31, 45 [I/II]; 288-289, 292-294, 296, 300, 313, 322 [I]

NOTE: Volumes 1 and 2 of the report are indicated by [I] and [II], respectively.

- water** pollution, 29,32 ~[II]; 217,219,278-279,284, 292, 294,296,328 [I]; 168, 170-171,251 [II]
 wetlands, 26, 28, 31, 33-34, 47 [I/II]; 276, 278 [I]; 170-171, 192-194, 199,200 [II]
 world demand, 282-284 [I]
see also crops; irrigation; livestock; U.S. Department of Agriculture
- Alabama, 270,273,305 [I]
 Alaska, 13,50-52,81,82 [I/II]; 166,221 [I]; 161, 163, 168, 185,209,221 [II]
 alpine areas, 91 [I/II]; 181,225 [II]
 American Indians, 212,222,243 [I]
 Antarctic
 ice cores, 80 [I/II]
 ozone layer hole, 73 [I/II]
- arid West
 agriculture, 276 [I]
 drought, 210,288 [I]
 irrigation subsidies, 240, 313 [I]
 precipitation pattern shifts, 9 [I/II]
 protected natural areas, 52 [I/II]
 snowmelt, 213 [I]
 water supplies, 212 [I]
 water transfers, 18 [I/II]; 292-293 [I]
 wetlands, 13, 47, 125 [I/II]; 167, 176, 178-179, 181, 184-186,201, 202,209 [II]
- Arizona, 215,223,224,237,246, 250,272-273 [I]
 Arkansas, 13 [I/II]; 270, 280 [I]
 Arkansas River Basin, 228,292,293 [I]
Association of State Floodplain Managers, 184 [I]
- Babbitt, Bruce, 30,37 [I/II]
 barrier islands, 39, 79 [I/II]; 154, 156, 158, 165, 176-178, 185-186, 199-200 [I]; 194 [II]
Battelle Pacific Northwest Laboratory, 141,143 [I/II]
 bears, 225,226,241 [II]
 biodiversity
 conservation, 49, 55-56, 109 [I/II]; 220, 232-233 [II]; *see also* natural areas
 Everglades, 29 [I/II]
 forests and, 336-342 [II]
 Gap Analysis Project, 129 [I/II]; 270-271 [II]
 National Biological Survey, 37,48,53,129,137,149, 150 ~[II]; 283-284 [II]
 preserves and, 19,49 [I/II]; 239,258 [II]
 protection, 53 [I/II]; 258 [II]
 wetlands, 167, 172, 178, 180, 182-183, 186 [II]
- Biosphere Reserves, 29 [I/II]; 230,246-248,275,288, 289 [II]
 biotechnology, 23 [I/II]; 284,306-307,315,323, 325 [I]
 birds, 29,33,51,93,96 [I/II]; 218,226,301 [I]; 165, 226-228 [II]
 Brown, George, 117 [I/II]
 Bureau of Land Management, 50 [I/II]; 222, 248 [I]; 188, 222,224,225,229,231, 235,237,240,242-244, 261, 270,277,279,289,313, 332-334,336,338,340, 344, 347 [II]
- Bureau of Reclamation, 43, 136 [I/II]; 233-234, 240, 243, 246,248,249-250,254, 257,263,294,295,313 [I]; 204,252 [II]
- California, 273 [I]
 agriculture, 31 [I/II]; 280,294-297,304,315 [I]
 Central **Valley** Project, 31 [I/II]; 219,223,224,236,238, 241,296-297 [I]; 209,252,255 [II]
 coastal population, 31 [I/II]
 drought, 22,32 [I/II]; 238-239,261 [I]
 Drought Water Bank, 236,238-239 [I]
 fires, 1,90 [I/II], 261 [II]
 floods, 253 [I]
 Imperial Valley, 237 [I]
 irrigation districts, 237-238 [I]
 Kesterson National Wildlife Refuge, 294-2% [I]
 Metropolitan Water District, 224, 236, 237, 241, 247, 261-262 [I]
 Owens Valley, 216,237,238 [I]
 Peripheral Canal, 32 [I/II]; 237 [I]
 San **Joaquin Valley**, 294-296,297 [I]
 San Luis Darn, Canal, and Reservoir, 295 [I]
 State Water Project, 31 [I/II]; 236,238,251,259 [I]
 water issues, 13,31-32 [I/II]; 214-215,216,219,222, 223, 224, 227, 236, 237, 240-241, **246**, 247, 259-262, 294-2% [I]; 210 [II]
 wetlands, 155, 160-161, 183, 209, 277 [II]
- Canada, 33 [I/II]; 230-231,260,298,299 [I]; 190 [II]
 carbon dioxide, 71-74, 75,87-89,94,98 [I/II]
 Antarctic ice cores, 66,71,80 [I/II]
 atmospheric concentrations, 50,65,66,73,80,89 [I/II]
 doubling **effects**, 70,75,76,93 [I/II]; 166,290 [I]
 ecosystem productivity, 88-89 [I/II]
 emission scenarios, 72,73 [I/II]
 fertilization effect, 11, 66, 70, 87-89 [I/II]; 287 [I]; 175-176,323 [II]
 long-term records, 71,80 [I/II]
 Sinks, 51 [I/II]; 165, 168, 185,310-311 [II]
- caribou**, 50 [I/II]; 185, 225 [II]
 Carnegie Commission, 143 [I/II]
 Carnegie Mellon University, 140, 143 [I/II]
 Carson River Basin, 248, 2S1 [I]
 Chesapeake Bay, 81,87 [I/II]; 157 [I]; 163, 175, 176, 183, 199 [II]
- chlorofluorocarbons**, 65,72, 73, 112 [I]
 Clean Water Act
 fishery improvement, 82 [I/II]
 municipal sewage treatment funding, 197-198, 202, 220-221,242 [I]
 non-point-source pollution, 215,220 [I]; 200 [II]
 reauthorization, 44 [I/II]; 219,220-221 [I]
 water **conservation**, 44 [I/II]; 264 [I]
 watershed management, 25,48 [I/II]; 205,206,209,210, 220,215,256 [I]
 wetlands protection, 36, 48 [I/II]; 202, 221 [I]; 154, 155, 157, 159, 178-179, 188, 189, 191, 195-196, 198,200, 203,205-206,209-212 [II]
- clouds and cloud cover, 68, 87 [I/II]

- coastal areas
 barrier islands, 39,79 [I/II]; 185-186, 199-200 [I]
 beach nourishment and shoreline protection, 41-42 [I/II];
 154, 168, 172-176,202,204 [I]
 building **codes**,199[I]
 demographic trends 155-156 [I]
 development pressures, 39,40 [I/II]; 166 [I]
 development subsidies, 17,18,21 [I/II]; 172,176,177 [I]
 disaster assistance, 21,41 [I/II]; 171-173, 198-199 [I]
 erosion, 9,26,39,41,51,79 [I/II]; 155,156,157,170-171,
 181, 187-188, 191, 194-195, 201 [I]; 173, 182, 183,
 186 [II]
 flood insurance, 18, 21, 26, 41 [I/II]; 168-171, 180-182,
 194-198 [I]
 flooding, 155, 156, 157 [I]; 186 [II]
 hazard assessment and mitigation, 26,40 [I/II]; 166, 167,
 174-175, 183-185, 198-199,200,201,203 [I]
 hurricanes and coastal storms, 13,39,90 [I/II]; 154, 155,
 159-166, 171, 188-191 [I]
 institutional fragmentation and **regulatory** obstacles, 18
 [I/II]; 178-179 [I]
 land acquisition, 200,201 [I]
 management legislation **and** programs, 21,41 [I/II]; 154,
 178-179, 185-194, 196,201 [I]; 193 [II]
 mangroves, 29,99 [I/II]; 160, 172 [II]
policy options, 40-42 [I/II]; 194-204 [I]
 population pressures, 5, 13,31,39,82 [I/II]; 154, 156 [I]
 retreat policies, 175, 179, 188, 192-193, 197 [I]; 207 [II]
 risk allocation and management, 154 [I]; 201 [I]
saltwater intrusion, 13,32,96 [I/II]; 215 [I]; 176, 182 [II]
 sea level rise, 8-9, 13, 39, 79, 93,94 [I/II]; 154, 155-157,
 159, 197 [I]; 173-174, 182, 186 [II]
 setback provisions, 175, 179, 181, 187, 196,201,202 [I];
 193, 195,206 [II]
 “takings” issue, 177-178, 191 [I]
 tax code subsidies, 21-22 [I/II]; 168, 176,200 [I]
 V zones, 168, 169, 171, 181, 196 [I]
 vulnerability, 5,6, 13, 15,39 [I/II]; 154-166 [I]
 wetlands, 9, 12, 15, 21, 47 [I/II]; 159, 160, 165, 190, 202
 [I]; 169-170,180-183,186, 193,201 [II]
 Coastal Barrier Resources System, 185,200 [I]
 Colorado, 213,215,238,246,248, 272,280,285,292,293
 [I]; 179,257 [II]
 Colorado River Compact, 224-225 [I]
 Colorado River Basin, 13 [I/II]; 216, 2X-225, 237,239,246,
 259 [I]
 Columbia River, 260 [I]; 175 [II]
 Committee on Earth and Environmental Sciences (CEES),
 113-115, 118, 121, 132, 133, 136, 138, 146 [I/II]
 committee on Science, Engineering, and Public Policy
 (COSEPUP), 4,6, 110 [I/II]
Connecticut, 269 [I]
 conservation
 biological diversity, 49,55-56, 109 [I/II]
 Federal programs, 278-280 [I]
 forest, 55-56 [I/II]; 346 [II]
 funding, 54 [I/II]; 265-266 [II]
 habitat, 236-238 [II]
 incentives, 21 [I/II]; 287-288 [II]
soil, 278, 279, 301 [I]
 species, 54, 127 [I/II]; 235-238 [I]
 wetlands, 278 [I]; 192-193 [II]
see also water conservation
 Conservation Reserve **Program**, 233,278,284,318 [I]; 190,
 191, 194,268, 287 [II]
 Consortium for International Earth Science Information,
 274 [II]
 conventions and treaties
Biodiversity Convention, 109 [I/II]
 Framework Convention on climate Change, 2, 109 [I/II]
 Montreal Protocol, 73, 109 [I/II]
 crop insurance, 21, 26, 33, 36-37, 45 [I/II]; 172, 199,
 254-255,312-313,320, 321,328 [I]
cropland
 distribution and land **area**, 277,282,294 [I]
 forest clearance for, 296 [I]
 harvested acreage, by crop, 284 [I]
 irrigated, 282, 287-289, 294-2%, 301-302 [I]
 soil moisture, 100 [I/II]
 crops
 adaptation to climate change, 17 [I/II]; 291, 298-300,
 308-309 [I]
 barley, 302,311 [I]
 breeding, 277,289,298-299,306, 323,325,327 [I]
 contingency **planning**, 22 [I/II]
 corn, 278,284,285,287,288, 289,291,298,299,300, 302,
 303,305,306,311 [I]
 cotton, 87 [I/II]; 284, 301, 302, 306, 308, 311 [I]
 disease- and pest-resistant, 299,306-307 [I]
 drought-tolerant species, 300 [I]
 exports, 277-278 [I]
 genetically engineered, 307,325 [I]
Kenaf, 309,311 [I]
 new crops, 300, 308-309, 325 [I]
 nutritional quality, 287 [I]
 oats, 300, 311 [I]
oilseeds, 309, 311 [I]
 range, 9 [I/II]; 276, 277 [I]
 rice, 284, 287, 611 [I]
 sensitivity to climate change, 13,45, 81 [I]; 287-289 [I]
 simulation, 290, 308 [I]
 sorghum, 284, 287, 301, 302, 303, 305, 309, 311 [I]
soybeans, 45,81 [I/II]; 278,284,285,287,300, 305,306,
 311 [I]
 sugar cane, 287 [I]
 wheat, 33, 34 [I/II]; 277, 278, 284, 285, 287, 288, 291,
 298-299,300,301,303, 305,306,311 [I]
 yields, 290,305,306,322-323 [I]
see also crop insurance
 Crown of the Continent Project, 249 [II]
 darns, 17 [I/II]; 215, 258,293 [I]
Delaware, 269 [I]
 Delaware River Basin, 23,24 [I/II]
Delmarva Peninsula, 157 [I]
 desalination, 259-260 [I]

372 | Preparing for an Uncertain Climate--Volume 2

- disaster assistance
 - agricultural programs, 19, 26, 36-37, **45-47 [I/II]**; 276, 310,312-313,319-322, 326-328 **[I]**
 - congressional oversight, 199 **[I]**
 - for crop losses, 7,21,45,46-47 **[I/II]**;
 - defining** disasters, 21,4647 **[I/II]**; 320,328 **[I]**
 - Federal share, 198,310 **[I]**
 - crop insurance, 21, 26, 33, 36-37, 45 **[I/II]**; 172, 199, 254-255,312-313,320, 321,328 **[I]**
 - emergency loans, 173, 176,279,313 **[I]**
 - hazard-reduction programs and, 166,198-199 **[I]**
 - for hurricanes, 7 **[I/II]**; 154, 172 **[I]**
 - legislation, 41,4647 **[I/II]**; 171,183-185,203,312, 313, 321 **[I]**
 - Mississippi River floods, 7 **[I/II]**, 228-231 **[I]**, 175 **[II]**
 - payments, 7,47 **[I/II]**; 154,172,310,312,321, 328 **[I]**
 - policy options, 47-48 **[I/II]**; 198-199,203,310,319-322, 326,327 **[I]**
 - Residential disaster declarations, 178,185, 199,312 **[I]**
 - public assistance grants, 168-169,171-172, 198,199 **[I]**
 - reforms, 19,21,40,46-47 **[I/II]**; 154,172-173,198-199 **[I]**
 - risk** perception and, 21,26 **[I/II]**
 - self-insurance program, 322 **[I]**
- disease, 14,88-89 **[I/II]**; 224 **[II]**
- drought
 - agricultural effects, 13,45 **[I/II]**; 288,293,304-305 **[I]**
 - assessment programs, 255 **[I]**
 - Australia**, drought policy, 252,320 **[I]**
 - California**, 22,32 **[I/II]**; 238-239 **[I]**
 - economic **effects**, 228 **[I]**
 - Florida**, 28-29 **[I/II]**
 - frequency**, 69 **[I/II]**
 - government assistance, 34 **[I/II]**
 - inland water transportation and, 227-231 **[I]**, 288 **[I]**
 - interagency task force, 22,43 **[II]**
 - legislation, 255 **[I]**
 - management, 27,42 **[I/II]**; 251-256 **[I]**
 - pests** and, 94 **[I/II]**
 - policy options**, 43 **[I/II]**; 254-256 **[I]**
 - prairie potholes and, 33-34 **[I/II]**
 - precipitation pattern shifts and, 9 **[I/II]**
 - preparedness planning, 255 **[I]**
 - public-awareness programs, 255 **[I]**
 - severity index**, 69 **[I/II]**; 228 **[I]**
 - State plans**, 27 **[I/II]**, 252 **[I]**
 - water bank, 236,238-239,279 **[I]**
 - water resources and, 42 **[I/II]**; 210,251, 293 **[I]**; 179 **[II]**
- Ducks Unlimited**, 129 **[I/II]**; 195 **[II]**
- Earth Day 1993,2 **[I/II]**
- Ecological Society of America**, 138 **[I/II]**; 268,269 **[II]**
- economic issues
 - adaptation** research, 133-134 **[I/II]**
 - in agriculture, 276-278,280,288, 291 **[I]**
 - drought, 228 **[I]**
 - fisheries**, 31 **[I/II]**; 163-164, 183 **[II]**
 - forests, 302, 316, 328-330, 332, 335-336, 341-342, 345-349 **[II]**
 - gross national product, 10 **[I/II]**
 - preserves, 232 **[II]**
 - transportation, 14, 15 **[I/II]**; 227,231 **[I]**
 - water quality and quantity, 5,7 **[I/II]**
 - wetlands, 154-155, 162-164, 166, 178, 183 **[II]**
- ecosystems
 - adaptability to climate change, 6,79-80 **[I/II]**
 - anthropogenic stresses, 66,88, 90-91 **[I/II]**
 - arctic**, 87 **[I/II]**
 - corridors, 242-243 **[II]**
 - declines and **diebacks**, 93-94 **[I/II]**
 - direct climate impacts, 91-% **[I/II]**
 - fragmentation**, 19,49,66,90 **[I/II]**; 239-MO **[II]**
 - Greater **Yellowstone**, 19 **[I/II]**; 226,243-245,250 **[II]**
 - Holdridge** Life Zones, 91, 95, % **[I/II]**
 - management models, 244-250 **[II]**
 - research, 35,53-54, 111, 148-150 **[I/II]**; 269 **[II]**
 - restoration, 17 **[I/II]**; 154-156,276-277 **[II]**
 - water resources and, % -98 **[I/II]**
- education, see public education
- Electric Power Research Institute, 143 **[I/II]**
- endangered and threatened **species**, 29, 30, 31,47, 53, 93 **[I/II]**; 219,221,235-238 **[I]**; 162,165,183,186,190, 192,208,221,225,232-233, 241,258,268 **[II]**
- energy use
 - sensitivity and adaptability, 6, 14, 15 **[I/II]**
 - water resources and, 211-213,227 **[I]**
- Environmental and Energy Study Institute, 150 **[I/II]**
- Environmental Conservation **Acreage Reserve Program**, 268 **[II]**
- Environmental Protection Agency (EPA)
 - adaptation research, 133,135 **[I/II]**
 - agriculture-related** programs, 280 **[I]**
 - assessments of climate change, 100, 102-103, 110, 143 **[I/II]**
 - climate change research, 75, 133 **[I/II]**; 289, 290 **[I]**; 207 **[II]**
 - Environmental Monitoring and **Assessment Program**, 193, 199,200,210-211,268, 270 **[II]**
 - watershed management, 245 **[I]**
 - wetland management,48 **[I/II]**; 178 **[I]**; 155,157,179,188, 189, 193,205,206 **[II]**
- evapotranspiration, 13,33,65,69,77,97,98 **[I/II]**
- Executive **Orders**
 - Executive **Order** 11988 (Flood Plain Manag^ement), 192, 198 **[II]**
 - Executive Order 11990 (Protection of **Wetlands**), 155, 192, 198 **[II]**
 - Executive Order 12656,252,254 **[I]**
- Experimental Forests, Ranges and **Watersheds**, 23,56 **[I/II]**; 231 **[II]**
- extreme events
 - climate** change and frequency of, 1,66 **[I/II]**; 250-251 **[I]**
 - contingency **plarming**, 5,22-23,26-27 **[I/II]**
 - management**, 42-43 **[I/II]**; 250-257,262-263 **[I]**
 - policy **options**, 22-23 **[I/II]**; 194-24)2, 254257, 319-322 **[I]**; 342-347 **[II]**
 - uncertainty **about**, 10-11 **[I/II]**

- wetlands effects, 172, 176, 183-184 [II]
see *also* droughts; fires; floods
- farms, see agriculture; crops
- Farmers Home Administration, 173, 176,279,313 [I]; 192, 201,203,212 [II]
- Federal Coordinating Council on Science, Engineering, and **Technology (FCCSET)**, 20, 30 n.7, 38-39, 110, 113, 139, 146, 148 [I/II]; 324 [I]
- Federal Crop **Insurance** Program, see crop insurance
- Federal Emergency Management Agency, 156, 168 [I]
Community Rating System, 180, 182 [I]; 208 [II]
disaster assistance, 171-173, 179, 198-199,254 [I]
flood **insurance**, 178-179, 180, 197 [I]; 193 [II]
floodplain mapping, 171, 197 [I]
hazard-mitigation requirements, 41 [I/II]; 198-199,203 [I]
- Federal Energy **Regulatory** Coremission, 233 [I]
- Federal Insurance **Administration (FIA)**, 168, 171, 1% [I]
- Fire** Island, 171 [I]
- fires
ecological benefits, 51, 90, 100 [I/II]
forest, 1,9, 12,22,26,27, 100 [I/II], 317,324,325,327, 329,330,342-347
management in protected areas, 261-263 [II]
- fisheries**
Aleutian-North **Pacific**, 13,50,51-52,81-82,86 [I/II]; 185 [II]
anadromous species, 82,95 [I/II]
commercially important species, 83-85 [I/II]
die-offs and declines, 29,31,81 [I/II]
effects of climate change, 13,51-52,81-82 [I/II]; 173-174, 183 [II]
endangered and threatened, 31 [I/II]
estuarine-dependent, 81 [I/II]
industry, 50, 81-82 [I/II]; 190 [I]
Louisiana-Gulf of Mexico, 84 [I/II]; 173-174 [II]
overfishing of, 51-52 [I/II]
oysters, 81 [I/II]; 186 [II]
regional characteristics of, 83-85 [I/II]
Sacramento-San **Joaquin** River System, 31 [I/II]
salmon, 31, 50, 81, 82 [I/II]; 215 [I]; 226
shrimp, 29 [I/II]; 174, 186 [II]
striped bass, 31, 81 [I/II]; 183 [II]
temperature effects, 81 [I/II]; 215,219 [I]
wetlands role, 47, 81 [I/II]; 163-164, 174, 181 [II]
- Fish and Wildlife 2000,277 [II]
- flood-control measures
coastal areas, 174-175 [I]; 183 [II]
Federal agencies involved in, 254 [I]
jurisdictional fragmentation, 25 [I/II]; 233-234 [I]
migration of wetlands and, 12 [I/II]; 182 [II]
and storm surges, 213 [I]
water resource **planning** and, 42 [I/II]
and wetlands, 47 [I/II]; 162, 164, 166, 168, 174, 182, 183 [II]
- floodplain
development, 10 [I/II]; 253 [I]; 192 [II]
management, 43 [I/II]; 168, 179-180,253,256 [I]; 208 [II]
- mapping**, 171, 197 [I]
wetlands, 161 [II]
- floods
coastal areas, 39 [I/II]; 155 [II]
infrastructure aging and, 227 [I]
insurance, 168-171, 180-182 [I]
land area subject to, 253 [I]
management, 253-254,256-257 [I]
Midwest (1993), 1,7, 10,15,22 [I/II]; 231 [I]; 203 [II]
national assessment board, 22,43 [I/II]; 256 [I]
policy options, 22 [I/II]; 256-257 [I]
vulnerability to, 253-254 [I]
see *also* **National Flood Insurance Program**
- Florida**
agriculture, 280,285,305 [I]
barrier islands, 39 [I/II]
building codes, 179, 193 [I]
coastal management, 187, 191, 193,200 [I]
coastal population and development, 155, 156, 164, 174, 179 [I]
droughts, 28-29 [I/II]
endangered species, 241 [II]
Everglades, 25,28-30 [I/II]; 219 [I]; 205,209 [II]
fisheries, 84 [I/II]
flood control, 28 [I/II]
hurricanes, 1,7,22,28,29 [I/II]; 154-156,163-165,171 [II]
mangroves, 172 [II]
protected **areas**, 257 [II]
sea level rise, 79 [I/II]; 156, 157 [I]
water issues, 28,42 [I/II]; 215,219, 223,261,270 [I]; 210 [II]
wetlands, 160, 161, 164, 175, 182, 207,209 [II]
- Forest **Legacy** Programs, 57 [I/II]; 335,341,341 [II]
- forest** management, 6 [I/II]
even-flow-harvest requirement, 22 [I/II]; 347-348 [II]
private lands, 56 [I/II]; 334-336 [II]
protection of forest health, 22,56 [I/II]; 343-347 [II]
public lands, 332-334 [II]
risk communication, 22,26 [I/II]
response to climate change, 17,55,56 [I/II]; 330-336 [II]
trends, 27 [I/II]; 317,319-320 [II]
- Forest Stewardship **Program**, 57 [I/II]; 335,341,342 [II]
- Forestry Incentives **Program**, 57 [I/II]; 335,341,342,346 [II]
- forests
adaptability, 6,15,19,23,54,55 [I/II]; 320-330 [II]
Blue Mountains, 27 [I/II]; 318-319,329 [II]
boreal, 50,51 [I/II]
carbon releases, 51 [I/II]
CO₂ concentrations and, 66 [I/II]; 323 [II]
conservation and preservation methods, 55-56 [I/II]
declines and dieback, 9, 12, 54, 55, 56, 93-94 [I/II]; 342-346 [II]
dispersal and **colonization rates**, 12 [I/II]; 304-305, 308-309,311,315 [II]
fins, 1,9,12,22,26,27,100 [I/II]; 261-263,317, 324, 325, 327,329,330,342-347 [II]
forest health, 22,56 [I/II]; 343-347 [II]
fragmentation, 21,55 [I/II]; 326 [II]

- hurricane damage, 189-190 [I]
- incentive programs, 56-57 [I/II]; 342,346-349
- land area, 54 [I/II]; 303-304,308-309,311, 315 [II]
- legislation, 56-57 [I/II]; 312-314,343,346,348 [II]
- migration, 12,14,52,54,94 [I/II]; 321-323,332-333,336
- monitoring, 125 [I/II]
- policy options, 21,22 [I/II]; 336-349 [II]
- precipitation pattern shifts and, 9 [I/II]
- private lands, 21 [I/II]; 341-342,346-347,348-349
- research, 23,55 [I/II]
- resources, 301-303,315-317 [II]
- seed banks, 23, 55-56 [I/II]; 336-338 [II]
- vulnerability, 6, 15,19,54-55 [I/II]; 324,326-328 [II]
- types, 304 [II]
- see also timberland
- fossil fuels, 2 [I/II]; 212,227 [I]
- General Accounting Office (GAO), 186,200,252 [I]; 189, 264 [II]
- general circulation models (GCMs), 78,91,99 [I/II]
 - CO₂ doubling effect, 76 [I/II]; 166,290 [I]
 - global climate change predictions, 68-70 [I/II]
 - precipitation changes, 76 [I/II]
 - principles, 68 [I]
 - runoff predictions, 212-213 [I]
 - soil-moisture predictions, 9, 11,69,77-78,99, 101 [I/II]
 - temperature predictions, 2,29,67,76 [I/II]
 - uncertainties and generalities in, 68-70 [I/II]; 213 [I]
 - vegetation shifts, 91 [I/II]
- Geophysical Fluid Dynamics Laboratory (GFDL), 9,11,76, 78,99-101 [I/II]; 290 [I]; 322 [II]
- Georgia, 157,186,194,215,270 [I]; 164,210 [II]
- Gibbons, John, 112 [I/II]
- Goddard Institute for Space Studies (GISS), 9, 11, 76-78, 100-101 [I/II]; 290 [I]; 322 [II]
- Gore, Albert, 147 [I/II]
- Great Lakes, 13,14,75 [I/II]; 166,186,192,228,230-231 [I]; 186 [II]
- greenhouse gases
 - atmospheric concentrations, 65,74,75 [I/II]
 - Climate Convention and, 2 [I/II]
 - emissions, 2, 74 [I/II]
 - feasibility of reduction, 2 [I/II]
 - predicted changes in, 71-73 [I/II]
 - sources, 72,73 [I/II]
- groundwater
 - adaptation to declines in, 301-302 [I]
 - integrated management with surface water, 23, 25 [I/II]; 210,250,246-247,301-302 [I]
 - overdrafts, 9 [I/II]; 212,218,223-224 [I]
 - pollution, 219,284 [I]
 - precipitation pattern shifts and, 9 [I/II]
 - reasonable use doctrine, 222 [I]
 - saltwater intrusion, 29 [I/II]; 155, 212, 213,217, 219 [I]; 176 [II]
- Gulf Coast (U.S.), 12, 13, 39 [I/II]; 156, 159, 164, 167, 217-218 [I]
- Gulf of Mexico, 79 [I/II]; 156-157 [I]; 175 [II]
- Gunnison River Basin, 248 [I]
- habitats
 - conservation plans, 236-238 [II]
 - fragmentation, 3,5,13,19,86,92-93, 96 [I/II]
 - needs of wildlife, 226 [II]
 - wetlands, 164-165 [II]
- Hawaii, 1,71,85 [I/II]; 166,273 [I]; 168 [II]
- hazard assessment, coastal, 26,40 [I/II]; 166, 167, 183-185 [I]
- Hazard Mitigation Grants program, 180, 183-185 [I]
- health (human), 6, 14,15 [I/II]
- Holdridge Life Zones, 91, 95, % [I/II]
- hurricanes and storms
 - Andrew, 7,22,29 [I/II]; 154-156,163,165,168, 171,172, 179, 193 [I]
 - coastal effects, 13, 39 [I/II]; 159-166, 189-191 [I]
 - contingency plans, 22 [I/II]
 - damage-producing potential, 161, 163, 166,202 [II]
 - economic costs, 163, 165, 168, 172, 189-191 [I]
 - Federal disaster payments, 7 [I/II]; 154, 172 [I]
 - flood-insurance claims and payments, 168 [I]
 - historic, 159-160 [I]
 - Hugo, 7,22 [I/II]; 154, 155, 163, 165, 168, 172, 175-176, 188-191 [I]
 - Iniki, 154,155, 168 [I]
 - intensity, 11,75 [I/II]; 159, 160, 162-163 [I]
 - personal losses, 159, 191 [I]
 - property damages, 189 [I]
 - redevelopment in high-risk areas, 25 [I/II]
 - Saffir-Simpson scale, 162-163 [I]
- hydrologic cycle, % -97 [I/II]; 212-213 [I]; 165, 174,175, 186 [II]
- hydropower, 9 [I/II]; 211,227,231,233,248 [I]
- ice/snow melts
 - agricultural effects, 289 [I]
 - mountain snowpacks, 32,67,71 [I/II]
 - oceanic effects, 79 [I/II]
 - runoff and, 213 [I]
 - sea ice, 50-51,71,79 [I/II]
 - sea level rise and, 69,79 [I/II]; 156 [I]
 - temperature increases and, 70 [I/II]
 - transportation and, 14 [I/II]
- Idaho, 273,280 [I]; 244,260 [II]
- Illinois, 186,231,271,280,285, 288,305,315 [I]
- Illinois River, 228,230 [I]
- Indian Reservations, 222-223,243 [I]
- Indiana, 270,285 [I]
- indigenous cultures, 50,51, 83-85 [I/II]; 212 [I]; 185 [II]
- information technologies
 - agricultural applications, 46 [I/II]; 284, 305, 307-308, 323-328 [I]
 - Geographic Information Systems, 129 [I/II]; 273 [II]
- inland waterways
 - barge traffic, 227-228,288 [I]
 - dredge and fill activities, 188, 189, 198,229-230 [I]

- drought effects, 227-231, 288 [I]
- shipping, 14 [I/II]
- insects, 81, 86, 88-89, 94 [I/II]; 288
- Intergovernmental Panel on Climate Change (IPCC), 2, 4, 6, 72, 115 [I/II]
- climate change predictions, 10, 32, 68, 73, 111 [I/II]
- scientific assessment of climate change, 71, 74, 100, 102, 103, 110, 118 [I/II]
- sea level predictions, 78-79 [I/II]; 156, 159 [I]
- Interstate Coremission on the Potomac River Basin, 245, 249 [I]
- Interstate Council on Water Policy, 252 [I]
- Iowa, 33 [I/II]; 271, 280, 285 [I]; 181 [II]
- irrigation
 - adaptation to climate change, 303-304 [I]
 - alternatives to, 296, 301 [I]
 - conservation technologies, 4 [I/II]; 282, 301-305 [I]
 - cropland** distribution and acreage, 280, 282, 294, 301 [I]
 - groundwater withdrawals for, 301 [I]
 - moisture conservation and, 303 [I]
 - Newlands Project**, 252-253 [II]
 - with reclaimed water, 261, 293 [I]
 - in saline soils, 294-296 [I]
 - scheduling, 303, 305 [I]
 - subsidies, 17, 26 [I/II]; 240, 310, 313, 322, 326, 327 [I]; 200 [II]
 - water quality and, 294-296 [I]
 - water supplies and, 217, 237, 239, 276, 288-289, 304 [I]
 - wetlands losses and, 184 [II]
- Kansas, 271, 285, 298, 301 [I]; 183 [II]
- Kentucky, 271 [I]
- Kissimmee River**, 28, 29-30 [I/II]; 204 [II]
- Land Acquisition Priority System, 208, 266 [II]
- Land and Water Conservation Fund, 230, 237 [II]
- Land-use planning, 129 ~/II; 201 [I]; 159, 206, 207, 229, 248 [II]
- Legislation**
 - Acid Precipitation Act, 141 [I/II]
 - Agricultural Credit Act, 203 [II]
 - Alaska National Interest Lands Conservation Act, 221 [111]
 - Baucus-Chafee Water Pollution Prevention and Control Act**, 220 [I]
 - Central valley Project Improvement Act, 224, 264 [I]
 - Clean Air Act, 314, 318 [II]
 - Clean Water Act, *see* Clean Water Act
 - Coastal Barrier Improvement Act, 186 [I]
 - Coastal Barrier Resources Act, 40, 48 [I/II]; 180, 185-186, 199-200 [I]; 193, 194, 201, 212 [II]
 - coastal development, 191 [I]
 - Coastal Zone Management Act, 21, 37, 40, 41 [I/II]; 180, 186-188, 191-194, 199, 201 [I]; 192, 193 [II]
 - Coastal Wetlands **Planning**, Protection and Restoration Act, 192, 194, 202 [II]
 - Cooperative Forestry Assistance Act of 1978, 56-57 ~/11], 335, 346 [II]
 - Dingell-Johnson Act**, 191 [II]
 - drought-related, 255 [I]
 - Duck Stamp Act (*see* **Migratory Bird Hunting and Conservation Stamp Act**)
 - Earthquake, Volcanic Eruption, and Hurricane Hazards Insurance Act of 1993, 41 [I/II]; 203, 204 [I]
 - Emergency Wetlands Resources Act of 1986, 48 [I/II]; 190, 191-192, 194, 208, 209, 212, 267 [II]
 - Endangered Species Act, 30, 31 [I/II]; 219 [I]; 192, 210, 223, 233, 235-236, 255, 258, 267, 288, 313, 315, 319 [II]
 - Energy Policy Act of 1992, 44 [I/II]; 242, 264 [I]
 - Energy Security Act, 141 [I/II]
 - environmental impact assessments, 38 [I/II]
 - Everglades National Park Protection and Expansion Act, 29 [I/II]
 - existing statutory language, 37-39 [I/II]
 - Farm **Bills**, 36-37, 46, 56 [I/II]; 278-279, 312, 313, 321, 324, 327 [I]; 335, 341, 346, 348 [II]
 - Federal Aid in Wildlife Restoration Act of 1937, 191, 267-268 [II]
 - Federal Aid in Fish Restoration Act of 1950, 191, 267-268 [II]
 - Federal Crop Insurance Act, 312 [I]
 - Federal Crop Insurance Reform Act of 1990, 321 [I]
 - Federal Disaster Preparedness and Response Act of 1993, 41 [I/II]; 203 [I]
 - Federal **Insecticide, Fungicide, and Rodenticide Act**, 279, 280 [I]
 - Federal Land Policy and Management Act of 1976, 313, 334 [II]
 - Federal Power Act, 38 [I/II]
 - Federal Water Pollution Control Act, 189 [II]
 - Fish and Wildlife Conservation Act of 1980, 54 [I/II]; 291, 266, 268, 288 [II]
 - Fish and Wildlife Coordination Act, 38 [I/II]; 192 [II]
 - Flood Disaster Protection Act, 168 [I]
 - Food, Agriculture, Conservation, and Trade Act, 309, 312 [I]; 190, 192, 194, 268, 335, 341 [II]
 - Food Security Act of 1985, 312 [I]; 191, 192, 194 [II]
 - Forest **Ecosystems** and Atmospheric Pollution Act of 1988, 279, 343 [II]
 - Forest and Rangeland Renewable Resources Research Act**, 336, 343 [II]
 - Forest and Renewable Resources Planning Act** of 1974, 312, 325 [II]
 - forest management, 56 [I/II]
 - Hatch Act, 315 [I]
 - Henderson Wetlands Act of 1984, 209 [II]
 - Housing and Community Development Act, 180-181 [I]
 - Land and Water Conservation Fund Act of 1965, 190 [II]
 - Magnuson Fishery Act**, 82 [I/II]
 - Migratory Bird Conservation Act, 228 [II]
 - Migratory Bird Hunting and Conservation Stamp Act (**Duck Stamp Act**), 184, 189, 190, 194, 200 [II]
 - Migratory Bird Treaty Act, 228 [II]
 - Morrill Act**, 315 [I]
 - Multiple Use and Sustained-Yield Act, 312 [II]
 - National Environmental Protection Act, 276 [II]

- National Environmental Policy **Act**, 38 [I/II]; 155, 192, 199, 255, 312 [II]
- National **Forest Management Act**, 347 [II]
- National Flood **Insurance Act**, 168, 180 [I]; 193 [II]
- National Flood Insurance Compliance, Mitigation, and Erosion Management Act of 1993, 41, 43 [I/II]; 194, 203, 256, 263 [I]
- National Flood Insurance Reform Act, 194, 203 [I]
- National **Forest-Dependent Rural Communities Economic Diversification Act** of 1990, 336, 348 [II]
- National Forest Management Act**, 22 [I/II]; 312 [II]
- National Park **Service Organic Act** of 1916, 228, 234, 314 [II]
- National Parks and **Recreation Act**, 245, 314 [II]
- National **Wildlife Refuge System Administration Act** of 1966, 228 [II]
- North American Wetlands **Conservation Act** of 1989, 190, 208 [II]
- Omnibus Budget Reconciliation Act, 311, 318 [I]
- Open Space **Preservation Act** of 1991, 200 [II]
- Pacific Northwest Electric Power Planning and Conservation **Act**, 38 [I/II]
- Pittman-Robertson Act, 191 [II]
- protected natural areas, 228-230 [II]
- public land **acquisition**, 38 [I/II]
- Public **Rangelands Improvement Act**, 334 [II]
- Reclamation Act of 1902, 313 [I]
- Reclamation Projects Authorization and Adjustment Act of 1992, 44 [I/II]; 264 [I]
- Refuge Recreation Act** of 1962, 228, 264 [II]
- research authorization, 38 [I/II]
- Rivers and Harbors Act of 1899, 189 [II]
- Robert T. Stafford Disaster Relief and Emergency **Assistance Act**, 171, 180, 184, 198 [I]
- Safe **Drinking Water Act**, 227, 280 [I]
- Science Policy **Act** of 1976, 20, 38-39, 146-147 [I/II]
- Smith-Lever Act**, 316 [I]
- Soil and Water Resources **Conservation Act**, 326 [I]
- Tax Reform Act of 1986, 242 [I]; 194, 200 [II]
- Truckee-Carson-Pyramid Lake-Water Settlement Act**, 254 [II]
- U.S. Global Change Research Act, 39, 113, 150 [I/II]
- Water Bank Act, 190, 194, 200 [II]
- Water Pollution Prevention and Control Act, 219, 245, 249 [I]; 209 [II]
- Water Quality Act, 280 [I]
- Water Resources **Development Act**, 29, 44 [I/II]; 250, 264 [I]; 192 [II]
- Water Resources **Planning Act**, 38 [I/II]; 249 [I]
- wetland protection**, 47, 48 [I/II]; 188 [II]
- Wild and **Scenic Rivers Act**, 179, 229, 256 [II]
- Wilderness Act**, 221, 224, 229, 239, 256, 267, 312 [II]
- Wildlife Refuge **Administration Act**, 264 [II]
- livestock, 200, 202, 280-281, 285, 288-290, 300, 304, 306, 309-310 [I]; 178 [II]
- Long-Term Biological Research Program**, 268, 271, 283 [II]
- Louisiana**, 39, 40 [I/II]; 156-157, 166, 215, 270, 280, 315 [I]; 160, 163, 173-174, 182, 192, 194, 204, 209 [II]
- Maine, 159, 170, 188, 192, 269 [I]; 182, 206, 207 [II]
- Man and the Biosphere **Program**, 246-247, 275, 288, 289 [II]; see *also* **Biosphere Reserves**
- marine mammals, 50, 51, 52 [I/II]; 190-191 [I]
- Marine Sanctuaries **Program**, 194 [II]
- Maryland**, 157, 176, 269, 315 [I]
- Massachusetts, 225, 240, 269 [I]; 164, 210, 259 [II]
- Massachusetts Institute of **Technology**, 143 [I/II]
- Mauna Loa Observatory**, 71 [I/II]
- methane, 51, 65, 72, 73 [I/II]
- Mexico**, 215, 217-218 [I]; 190 [II]
- Michigan**, 192-193, 271, 285 [I]; 189 [II]
- migration
- corridors, 12 [I/II]; 223-224, X2-244, 286, 287 [II]
 - facilitation of, 187, 206-208 [II]
 - flyways**, 183, 227, 247, 253, 255 [II]
 - forests, 12 [I/II]; 321-323, 332 [II]
 - fragmentation of habitats** and, 92-93 [I/II]; 181, 242 [II]
 - obstacles to**, 12, 93, 94 [I/II]; 180, 182, 186 [II]
 - preserves**, 247, 250-251 [II]
 - wetlands**, 12, 47, 93, 94, 99, 100 [I/II]; 166, 192 [I]; 176, 180, 182, 186, 206-208 [II]
- Migratory Bird Conservation Fund**, 189 [II]
- Minnesota**, 33 [I/II]; 271, 240, 285, 290 [I]; 173, 181 [II]
- Mississippi, 270 [I]; 164, 173, 174 [II]
- Mississippi Delta, 12, 79, 129 [I/II]; 157, 215 [I]; 173-175, 182, 183 [II]
- Mississippi River
- barge backups, 227-231, 288 [I]
 - diversions, 260 [I]
 - drought effects, 10 [I/II]; 228-231 [I]; 175 [II]
 - flooding, 7, 10, 15, 22 [I/II]; 228-231 [I]; 175, 204 [II]
 - Gulf outlet, 204 [II]
 - international controversy, 230-231 [I]
 - navigation on, 228-231 [I]
- Missouri**, 13 [I/II]; 229, 230, 271, 285 [I]
- Missouri River, 227, 229, 232 [I]
- Mitigation and Adaptation **Research strategies** (MARS), 118, 132-134, 138 [I/II]
- models/modeling
- crop simulation, 290, 308 [I]
 - Extended **Streamflow Prediction**, 248 [I]
 - funding for, 250 [I]
 - hydrological, 38, 44 [I/II]; 248 [I]
 - Integrated **Climate Change Assessment Model**, 143 [I/II]
 - for **water-management decisionmaking**, 248 [I]
 - Weather Resources Forecasting System**, 248 [I]
- see *also* general **circulation models**
- Montana**, 33 [I/II]; 232, 272, 285, 313 [I]; 173, 181, 244, 277 [II]
- municipal sewage treatment, 220-221 [I]; 155, 200-201 [II]
- National **Academy of Sciences (NAS)**, 54, 100, 102-104, 140, 143, 149, 252 [I/II]; 157, 166, 185-186, 281-282 [II]
- National Acid Precipitation Assessment Program (**NAPAP**), 140-142 [I/II]

- National Aeronautics and Space Administration, 119, 131, 136, 141 [I/II]
 ecological studies, 125, 134-135 [I/II]
 Global Climate Change Program, 274 [II]
 Mission to Planet Earth, 122-124 [I/II]
 National Biological Survey, 37, 48, 53, 149, 150 [I/II]; 199, 200, 210-211, 283-284, 289-290 [II]
 National **Commission** on the **Environment**, 145 [I/II]
 National Committee on Property Insurance, 165 [I]
 National Estuary Program, 234, 280 [I]; 193 [II]
 National Flood Insurance Fund, 169-170 [I]
 National **Flood Insurance Program**, 166 [I]
 claims and payments, 163, 168, 170 [I]
 coastal high-hazard (V) zones, 168, 169, 171, 196-197 [I]
 community participation, 168-169, 253 [I]
 costs per structure, 170 [I]
 disaster-assistance grants, 168-169, 172, 199 [I]
 erosion zones and management standards, 170-171, 194-195 [I]
 Federal financial liability, 169, 1% [I]
 flooded-properties-purchase program, 175, 180 [I]
 floodplain-management standards, 168, 179-180 [I]
 hurricane damages, 163 [I]
 legislation, 41, 43 [I/II]; 168, 194, 203 [I]
 mandatory participation, 168, 170 [I]
 mapping and rate structure, 197 [I]
 premium rates, 21 [I/II]; 169, 194, 197 [I]
 reform options, 21, 22, 40, 41 [I/II]; 154, 194-198, 203 [I]
 risk calculations, 257 [I]
 sea level rise and, 22 [I/II]; 197 [I]
 Section 1362 Flooded Properties Purchase Program, 180 [I]
 Upton-Jones Relocation Assistance, 175, 178, 180-182, 197-198 [I]
 wetland development and, 193, 206, 208 [II]
 National Forest Genetic Resources Program, 56 [I]; 337 [II]
 National Forests, 50 [I/II]; 190, 222, 223 [I]; 229, 230, 231, 309 [II]
 National Institutes of Health, 315 [I]
 National Marine Fisheries Service, 31 [I/II]; 155, 157, 188, 189 [II]
 National Marine Sanctuaries, 231 [II]
 National Oceanic and Atmospheric Administration; 231 [II]
 adaptation research, 133, 136-137 [I]
 coastal-hazards-management program, 41 [I/II]; 178, 186 194, 201, 203 [I]
 Estuarine Habitat program, 208-209 [II]
 Habitat Restoration Program, 203 [II]
 National Acid Precipitation Assessment Plan, 141 [I/II]
 non-point-source-pollution-management program, 201 [I]
 Office of Ocean and Coastal Resource Management, 188 [II]
 USGCRP research budget, 131 [I]
 Water Resources Forecasting System, 248, 250, 264 [I]
 wetlands protection, 188, 193, 194 [II]
 National Park Service, 30, 136 [I/II]; 188, 220, 221, 223, 224, 226, 228, 233, 243-245, 251, 255, 260, 275, 278, 285, 313-315, 332, 334, 344 [II]
 National Parks
 acquisition of sites, 266, 267, 286 [II]
 categories, 228 [II]
 Everglades, 25, 28-30 [I/II]; 219 [I]; 205, 209, 251 [II]
 Glacier, 238, 249, 251 [II]
 Grand Canyon, 238 [II]
 endangered species, 235 [II]
 land area and sites, 226 [II]
 legislative framework, 228, 234 [II]
 management philosophies and goals, 221, 223, 230, 262-263 [II]
 research needs, 282 [II]
 Rocky Mountain, 257 [II]
 value, 232, 238 [II]
 water rights, 222, 223 [I]
 Yellowstone, 100, 132 [I/II]; 220, 227, 238, 251, 261-263 [II]
 Yosemite, 238, 251 [II]
 National Research Council, 112, 136-139, 145 [I/II]; 306 [II]; 181, 185 [I]
 natural resources
 agriculture, 275-329 [I]
 coasts, 153-204 [I]
 forests, 299-351 [II]
 preserves, 219-291 [II]
 water, 209-273 [I]
 wetlands, 153-213 [II]
 National Science and Technology Council, 147 [I/II]
 National Science Foundation, 35, 133, 137, 141, 143, 149 [I/II]; 315 [I]; 193 [II]
 Long-Term Ecological Research Program, 271-272 [II]
 National Water Commission, 265 [I]
 National Weather Service, 193 [II]
 National Wetlands Inventory Program, 125, 129 [I/II]; 162, 165, 199, 200, 278 [II]
 National Wetlands Policy Forum, 185, 200, 208 [II]
 National Wetlands priority Conservation Plan, 190, 191 [II]
 National Wild and Scenic River System, 229, 230 [II]
 National Wilderness Preservation System, 221, 224, 228-230, 243, 267, 278, 279, 285 [I]; see also wilderness areas
 National Wildlife Refuges, 50 [I/II]; 220, 227, 279 [II]
 acquisitions, 190, 194, 266, 286 [II]
 Balcones Canyonlands Conservation Plan, 238, 247-248 [II]
 Browns Park, 250 [II]
 Cheyenne Bottoms Wildlife Area, 301-302 [I]
 Des Lacs, 250 [II]
 Ding Darling, 257 [II]
 endangered and threatened species, 235 [II]
 Greater Yellowstone Ecosystem, 243 [II]
 Kesterson, 294-296 [I]; 251 [II]
 land area, 226, 240 [II]
 legislative framework, 228 [II]
 management philosophies and goals, 221, 223, 225, 231, 238-239, 260, 264 [II]
 Pelican Island, 228 [II]
 policy options, 282, 286 [II]

- Stillwater**, 251,252-254 [II]
 water-allocation issues, 252-254 [II]
 wetlands, 171, 255 [II]
- natural areas
 acquisition policies, 17,21,22,36,54 [I/II]; 222,264-268, 291 [II]
 adaptability, 19,53 [I/II]; 220,258-264,266-268 [II]
 Alaskan, 50 [I/II]
 buffer zones, 242-243,244,245,246 [II]
 climate change and, 49 [I/II]; 222,254,256-258 [II]
 defined, 224-225, 227 [II]
 distribution, 227,240,247 [II]
 disturbance management challenges, 259-264 [II]
 economic issues, 232,236 [II]
 and endangered species conservation, 235-238,258 [II]
 exotic species, 260-261 [II]
fire management, 261-263 [II]
 human **impacts**, 248, 250-251, 263-264 [II]
 institutional fragmentation, 20, 52 [I/II]; 220, 222, 240, 243,250 [II]
 inventorying, and monitoring, 22, 23 [I/II]; 268-279, 280-285 [II]
 land acquisition, 189-190 [II]
 landscape fragmentation, 239-240,241-243 [II]
 legislative framework, 228-230 [II]
 management philosophies and goals, 52 [I/II]; 220, 221, 222,223,230-231,244-246 [II]
 pest control, 260-261 [II]
 protection strategies, 284-289 [II]
 research, 22,23 [I/II]; 268-279,280-284 [II]
shifting with climate change, 49 [I/II]; 220 [II]
 size considerations, 5, 19,23 [I/II]; 225-226,241 [II]
stresses (existing), 49 [I/II]; 220,239-253 [II]
 Sustainable Biosphere Initiative, 138 [I/II]; 269 [II]
 water allocation issues, 251, 252-256 [II]
see also national parks; national wildlife refuges; wilderness areas
- [The] **Nature** Conservancy
 Last Great Places Initiative, 246-248,273,283,288 [II]
 National Natural Heritage Program, 230,273 [II]
 wetlands protection, 195 [II]
- Nebraska**, 271,280,285,298,301 [I]; 183 [II]
 Nevada, 12 [I/II]; 215,216,273 [I]; 183 [II]
 New Hampshire, 269 [I]
 New Jersey, 157, 176, 187,269 [I]
 Pine Barrens, 245-246 [II]
 New Mexico, 216,217,246,272 [I]
 New York, 156, 157, 171,173, 187,269 [I]
 Adirondack Park, 248-249 [II]
 non-point-source pollution, 201, 220 [I]; 199,200 [II]
 North American Free Trade Agreement, 217 [I]
 North **Carolina**, 133 [I/II]; 172,179,187,188,191, 193,195, 270 [I]; 161, 182 [II]
 North **Dakota**, 33,34,48 [I/II]; 232,250,272,285,289 [I]; 181 [II]
 Northern Forest Lands Study, 249 [II]
- Office of Management and Budget, 117, 121,147 [I/II]
 Office of Science and Technology Policy (OSTP), 20,38-39, 54, 113,149 [I/II]; 281-282 [II]
Ogallala Aquifer, 223,301-302,304 @J
Ohio, 271,285 [I]
 Ohio River, 227-229 [I]
 oil and gas exploration and development, 50,52 [I/II]; 190 [II]
 Okefenokee Swamp, 90 [I/II]
Oklahoma, 272,285 [I]; 183,259 [II]
 Oregon, 159,273 [I]; 155,210 [II]
 Blue Mountain forests, 27 [I/II]; 318-319,329 [II]
Oroville, Lake, 251 [I]
 ozone layer depletion, 67,73, 112 [I/II]
- Pennsylvania, 270,315 [I]; 173 [II]
 pest control, 14,56,81,86,89 [I/II]; 260-261,279,292, 307 [II]
 photosynthesis, 87,88, 96 [I/II]; 175 [II]
 policy issues and options
 adaptation and mitigation research program, 147-148 [I/II]
 agricultural, 46-47 [I/II]; 316-328 [I]
 barrier island subsidies, 199-200 [I]
 beach-nourishment and shoreline-protection programs, 202,204 [I]
biodiversity protection, 336-342 [II]
 classification criteria for research, 147 [I/II]
 coastal zone management, 200,201,203-204 [I]; 206-208 [II]
 commodity support programs, 17, 19, 45, 46 [I/II]; 317-319,326,327
 communication of risk, 19,21-22, 25-26 [I/II]
conservation incentives, 21 [I/II]; 287-288 [II]
 contingency planning, 19,22-23,26-27 [I/II]
 cross-agency coordination, 48 [I/II]; 201 [I]; 186-187,202, 282,288-289 [II]
 disaster assistance, 47-48 [I/II]; 198-199, 203, 319-322, 326,327 [I]
 drought management, 43 [I/II]; 254-256 [I]
 flood insurance, 194-198,203 [I]
 flood management, 256-257 [I]
 forests, 21,55-56 [I/II]; 336-349 [II]
 geographic fragmentation, 19-21, 23 [I/II]; 186-187, 244-250 [II]
 irrigation subsidies, 322,326, 327 [I]
 land acquisition, 21,54 [I/II]; 200 [I]; 1%-197, 207, 291 [II]
 National Biological Survey, 37, 48, 53, 149, 150 [I/II]; 283-284,289-290 [II]
protected areas, 21,53-54 [I/II]; 210,279-291 [II]
 reauthorization cycle, 36-37 [I/II]
 research and information gaps, 19,23,27,30,35 [I/II]
 research augmentation, 19, 20, 53-64 [I/II]; 144-150 [I]; 210-211,213,281,290-291 [II]
 science interface with, 117-119 [I/II]
 statutory language, 37-39 [I/II]
 U.S. Global Change Research Act amendments, 150 [I/II]
water-demand management, 242-243 [I]

- water-marketing, 243-244 [I]
- water-quality management, 48 [I/II]
- water-supply management, 249-250, 262 [I]
- wetlands protection, 21,4749 [I/II]; 200, 202 [I]; 195-213 [II]
- Poplar Island**, 157 [I]
- population growth
 - agricultural demand and, 282,284 [I]
 - coastal areas, 5, 13, 31, 39 [I/II]
 - water supplies and, 212, 214-215, 218 [I]
- Potomac River Basin, 245 [I]
- prairie potholes, 9,12,26,33-34,47,48 [I/II]; 160-161,181, 183-184, 186, 190,202 [II]
- precipitation
 - distribution and forms, 79,98 [I/II]
 - predicted changes, 9,65,69,75-76,98 [I/II]
 - soil moisture and, 10, 77 [I/II]
 - temperature increases and, 10,68 [I/II]
 - water resources and, 13 [I/II]
 - wetlands and, 19 [I/II]; 175 [II]
- preserves, *see* natural areas
- Presidential Initiatives, 113 [I/II]
- public education
 - coastal hazards, 41 [I/II]; 203-204 [I]
 - drought mitigation, 255 [I]
 - risk communication through, 26,41 [I/II]
 - water conservation, 240, 302 [I]
- public lands
 - acquisition policies, 17,21,22,36 [I/II]; 264-268 [II]
 - administration of, 50 [I/II]; 226,231 [II]
 - for nature conservation, *see* natural areas
 - water rights, 222, 223 [I]
- Puerto Rico, 189 [I]; 209 [II]
- Puget Sound**, 159 [I]; 175, 182 [II]
- recreation, 6, 25 [I/II]; 211-212, 228, 231, 232, 248 [I]; 162-164, 168, 183, 184,202,232,239,328-330 [II]
- remote sensing, 123-132 [I/II]; *see also* satellites
- research
 - adaptation, 30, 111,132-139,147-148 [I/II]
 - agricultural, 16-17, 22, 26, 46 [I/II]; 279, 297, 299, 305, 308-310,317,323-324, 326 [I]
 - appropriations process, 35-36 [I/II]
 - cross-agency coordination, 20, 22, 54, 131-132 [I/II]; 282-283 [II]
 - ecosystem-scale, 35,53-54, 111 [I/II]; 290 [II]
 - integration of information systems, 270-274 [II]
 - new developments, 115-117 [I/II]
 - policy options, 20, 53-64 [I/II]; 144-150 [I/II]; 281, 290-291 [II]
 - in protected areas, 239 [II]; 282 [II]
 - satellite vs. **nonsatellite** measurements, 122-131 [I/II]
 - wetlands, 23, 48-49 [I/II]; 193-195, 210-211, 213 [II]
- see also* U.S. Global Change Research Program
- Research Natural Areas, 229,231,272-273 [II]
- reservoirs and reservoir systems, 7, 32, 43 [I/II]; 210, 227, 232, **244-246**, 251,257-259,263-264, 294-2%, 313 [I]
- Resource Conservation and Development Program, 279 [I]
- Rhode Island, 269 [I]
- Rio **Grande** Basin, 13 [I/II]; 215,217-218,249-250, 298, 309 [I]
- river basin management, 20 [I/II]; 210,224-225,244,249 [I]
- rivers, **flood-control** measures, 10, 12 [I/II]
- runoff**, 69-70,77,86 [I/II]; 212-213, 217 [I]
- Sacramento-San **Joaquin** Delta, 159,239,295 [I]
- Sacramento-San **Joaquin** River System, 26,31-32 [I/II]; 216 [I]
- San Francisco Bay, 32 [I/II]; 159 [I]; 155-156,175, 182 [II]
- San **Joaquin** River, 294-296 [I]
- satellites
 - Earth Observing System, 122-124, 127, 139, 140 [I/II]
 - Landsat, 126-127, 129, 130,131, 132 [I/II]
 - limitations of, 130-131 [I/II]
 - passive sensors, 126 [I/II]
 - temperature measurement, 67 [I/II]
- sea level rise
 - cause, 68-69,78-79 [I/II]
 - coastal effects, 8-9, 13,39,79,93,94 [I/II]; 155-157, 159, 213 [I]
 - flood insurance and, 197 [I]
 - historic, 78 [I/II]
 - Louisiana**, 173-174 [II]
 - Poplar Island erosion, 157 [I/II]
 - predicted changes, 32,65,74,78-79 [I/II]
 - saltwater intrusion, 13,55 [I/II]; 213 [I]; 182 [II]
 - setback legislation and, 187 [I]
 - storm surges and, 8-9 [I/II]; 155, 162-163,213 [I]; 173 [II]
 - wetlands and, 9, 12, 19, 29,47 [I/II]; 192 [I]; 176 [II]
- seed banks, 23, 55-56 [I/II]
- Small Business **Administration**, 163, 173 [I]
- Small Watershed Program, 233 [I]
- soil moisture
 - agriculture and, 10, 11, 34 [I/II]; 303, 308 [I]
 - precipitation patterns and, 10,77,86 [I/II]
 - predicted changes, 11,69,77-78,99, 101 [I/II]
 - remote sensing, 127, 129, 131 [I/II]
- soils
 - carbon emissions, 51,98 [I/II]; 185 [II]
 - conservation, 233, 254, 279 [I]
 - erosion control, 284 [I]; 164 [II]
 - nutrient cycling, 88, %, 98-99 [I/II]; 175 [II]
 - percolation rates, 77 [I/II]
 - salinization, 259,284, 296, 297 [I]
 - vegetation changes and, 98-99 [I/II]
- South Carolina, 155, 157, 175, 177-179, 188-191, 193, 270 [I]
- South Dakota, 272,285,289 [I]; 181 [II]
- South Florida Water Management District, 29 [I/II]
- South Platte River, 293 [I]
- species
 - adaptation to climate change, 49 [I/II]; 179-181 [II]

- extinctions**, 5, 17-18 [I/II]; 224, 241-242 [II]
 nonnative (exotic) and **nuisance**, 29,89,90,92 [I/II]; 169, 223,260-261,288 [II]
 reproductive failure, 91,94 [I/II]
 vulnerable, 259 [II]
 see **also** endangered and threatened species
- states**
 Comprehensive Outdoor Recreation Plans, 190,192 [II]
 contingency plans for extreme events, 27 [I/II]
 protected areas, 230 [II]
 wetlands protection, 195 [II]
- statutes, see legislation
- subsidies
 agricultural, 17, 19 [I/II]; 192,297,310,312-313, 318, 320 [I]
 coastal development, 17 [I/II]; 176, 177 [I]
 forestry, 56-57 [I/II]; 342,346-349 [II]
 irrigation, 17, 26 [I/II]; 240, 310, 313 [I]
 risk communication through reforms, 21 [I/II], 26
 Superior, Lake, 230 [I]
- surface water
 integrated management with groundwater, 210, 246-247 [I]
 prior appropriation doctrine, 222 [I]
riparian doctrine, 222 [I]
- Sustainable Biosphere Initiative, 268,268 [II]
- “takings” issue, 177-178, 191 [I]; 159,200 [II]
- taxes
casualty-loss deductions, 176, 186, 200 [I]
 coastal development subsidies, 40 [I/II]; 168, 176, 186, 200 [I]
 losses due to hurricanes, 190 [I]
 reforms, 40 [I/II]; 242-243 [I]
policy options, 21-22 [I/II]; 200,322 [I]
 risk communication through reforms, 21-22 [I/II]
 water-conservation incentives, 242 [I]
 wetlands conservation incentives, 190, 191, 194, 200, 212 [II]
- temperature
 changes in, 1,2, 10, 14, 65,66,68,73, 75,76, 91 [I/II]
 crop yields and, 288 [I]
 global long-term record, 67,80 [I/II]
 plant productivity and survival and, 80-81 [I/II]
 role of, 80-81, 86 [I/II]
 water, 81 [I/II]; 215, 217 [I]
- Tennessee**, 126 [I/II]; 258,227-231,271 [I]
Tennessee Valley Authority, 133, 141 [I/II]; 234, 254, 257, 258 [I]
- Terrestrial** Ecosystems Regional Research and Analysis Laboratory, 274 [II]
- Terrestrial** Research Interest Group, 138-139 [I/II]; 273-274 [II]
- Texas**, 272,309 [I], 209 [II]
 agriculture, 240, 280,285,301 [I]
 building **codes**, 179 [I]
 coastal hazards, 40 [I/II]; 156, 157, 179 [II]; 173 [II]
 coastal management program, 186, 194 [I]
- flooding, 157,170 [I]
 High Plains, 223,240 [I]
 hurricanes, 159, 163, 193 [I]
 preserve, 248 [II]
 sea level rise, 156, 157 [I]
 water issues, 13 [I/II]; 215, 217,222, 223, 240, 246, 301, 302 [I]
 wetlands, 160, 182, 183 [II]
- Tijuana** River, 175, 182 [II]
- timberland
 fanner-owned, 308-309 [II]
 hurricane damage, 189-190 [I]
 National Forest lands, 309,311
 ownership and management, 304-305, 308-309,311, 315 [I]
 private timber industry **lands**, 305,308 [II]
 public lands, 311,315 [II]
 revenues for conservation, 202 [II]
- tourism, 6,50,52 [I/II]; 189 [I]; 239 [II]
- transportation, 14, 15 [I/II]; 228-231,288 [I]; see **also** inland waterways
- treaties, see conventions and treaties
- Truckee River Basin, 248,252 [I]
- tundra**, 185 [II]
adaptation to climate change, 185 [II]
arctic, 178, 179, 181, 185 [II]
 carbon releases, 51 [I/II]; 185 [II]
CO₂ fertilization effect, 87 [I/II]
 indigenous people, 185 [II]
permafrost, 13,51 [I/II]; 161, 175, 176, 185 [II]
 vegetation changes, 51 [I/II]
 wetlands, 13,47 [I/II]; 161, 175, 176, 179, 181, 185 [II]
- United Nations
 Conference on Environment and Development, 2, 109 [I/II]
 Educational, **Scientific**, and Cultural **Organization**, 246 [II]
 Environment Program, 71,103 [I/II]
- Us. Army corps of Engineers
 Dredged **Materials** Program, 204-205 [II]
 drought-management assessment, 252,254 [I]
 flood control, 254 [I]
 inland water projects, 175,229 [I]
 Institute for Water Resources Municipal and Industrial Needs, 242 [I]
Kissimmee River restoration, 29-30 [I/II]
 policy options for improvements in, 249-250 [I]
 reservoir management, 43 [I/II]; 232,246,257,263-264 [II]
 responsibilities, 233 [I]
 shoreline protection and beach nourishment, 41-42 [I/II]; 159, 173-175,202,204 [I]
 water demand-rnsnagement evaluation program, 248 [I]
 wetlands protection, 48 [I/II]; 178,202 [I]; 155, 157, 158, 164, 174, 188, 189, 192-194, 199,203-206,210, 212 [II]
- U.S. Department of Agriculture, 141 [I/II]
 agriculture regions, 278, 280, 281 [I]

- Agricultural Stabilization and Conservation Service, 311 [I]; 188,191 [II]
- Alternative Agricultural Research and Commercialization Center, 309 [I]
- assistance programs**, 279 [I]
- Commodity Credit* Corporation, 311, 314 [I]
- &ought-watch system, 256 [I]
- Economic Research **Service**, 316 [I]
- Farmers Home **Administration**, 173, 176, 279, 313 [I]; 192,201,203,212 [II]
- National Resource Inventory, 193 [II]
- research and extension, 16-17, 22, 26, 35, 46, 133, 135 [I/II]; 279,297,308,310,315-316, 323-325 [I]
- resource assessment **and** program evaluation, 325-326 [I]
- Soil Conservation Service, 233,254, 157,279,302,310, 316,322,324,326 [I]; 157,188, 190,193 [II]
- Water Bank Program, 190 [II]
- water-related **responsibilities**, 190, 233 [I]
- wetlands protection, 48 [I/II]; 157,171,184,188,190, 191, 203,212 [II]
- see also U.S. **Forest Service**
- U.S. Department of Commerce, 141 [I/II]; 233 [I]; 163 [II]
- U.S. Department of Defense, 133 [I/II]; 188 [II]
- U.S. Department of Energy, 131, 133, 136, 141, 143 [I/II]; 233,315 [I]
- U.S. Department of Health and Human Services, 136, 141 [I/II]
- U.S. Department of Housing and Urban Development, 133 [I/II]; 176 [I]
- U.S. Department of Interior
- adaptation **research**, 133,135 [I/II]
 - coastal **barrier** mapping, 186 [I]
 - conservation incentive programs, 287 [II]
 - ecosystems research, 274,281 [II]
 - Everglades policy, 30 [I/II]
 - global change research **budget**, 119-120 [I/II]
 - interagency activities, 141 [I/II]; 245 [II]
 - land acquisition, 266 [II]
 - land-management agencies, 224,225,228,240-241 [II]
 - monitoring initiatives, 270, 274 [II]
 - National Biological Survey, 37, 48, 53, 149-150 [I/II]; 199,200,268,278,283 [II]
 - public lands, 35, 131-132 [I/II]
 - water-marketing role, 44 [I/II]; 243, 264 [I]
 - water-related responsibilities, 233-234 [I]
 - see also National Park Service; U.S. Fish and Wildlife **Service**
- U.S. Department of State, 141 [I/II]
- U.S. Department of **Transportation**, 173,176 [I]
- U.S. Department of Veterans **Affairs**, 168,176 [II]; 200 [I]
- U.S. Fish and Wildlife Service, 220,226,231 [II]
- Endangered Species Program, 235-238 [II]
 - fishing** limits, 31 [I/II]
 - Gap Analysis Project**, 129 [I/II]; 193, 199,208, 270-271 [II]
 - land acquisition, 200 [I]; 190 [II]
 - lands administered by, 225,228,244 [II]
 - management philosophy, 221, 238-239 [II]
 - National Wetlands Inventory **Program**, 125, 129 [I/II]; 162, 192,193, 199,200 [II]
 - National Wetlands Research Center, 193,210 [II]
 - North American Waterfowl Management Plan, 202, 208 [II]
 - responsibilities, 234 [I]
 - "take" permits, 237 [II]
 - wetlands protection, 48 [I/II]; 155,157,164,165,170, 179, 188-190, 192, 193, 199,212 [II]
 - water rights, 244 [I]
- U.S. Forest **Service**, 56, 125 [I/II]; 188,222,225-227,229, 231,240,242,244,249-251, 261,263,266,270,274, 279,289,309,312,313, 325,326,332,334,336, 338, 340,343-345,347,349 [II]
- U.S. Geological Survey, 136, 137 [I/II]; 166,234,248,250 [I]; 193,199 [II]
- U.S. Global Change Research Program (**USGCRP**)
- adaptation and mitigation research, 23, 110, 112, 116, 138-139, 147-148 [I/II]
 - appropriations, 121-122 [I/II]
 - Assessment program, 23, 111, 115-117 [I/II]
 - balance among participating agencies, 110,131-132 [I/II]
 - broadening, 145-148 [II]
 - budget, 23,35, 112, 116, 119-132, 139, 143, 148 [I/II]; 281 [II]
 - Climate and Hydrologic Systems and **Biogeochemical** Dynamics research, 120 [I/II]
 - Earth Process Research, 120, 136 [I/II]
 - Ecological Systems and Dynamics research, 23, 53-54, 111,120,134-136,139, 148-150 [I/II]; 269,275,281, 290-291 [II]
 - Economics Initiative, 136 [I/II]
 - Human Interactions research, 120,134, 136, 139 [I/II]
 - integrated assessments, 111, 112, 140-143, 146, 150 [I/II]
 - mission and priorities, 3,4-5, 30,49, 110-112, 114, 116, 118-133, 136-138,139 [I/II]
 - Integrated Modeling and Prediction, 115, 120 [I/II]
 - oversight, 143-144, 150 [I/II]
 - policy options, 143-150 [I/II]; 281 [II]
 - structure, 110, 112-115, 117 [I/II]
- Utah, 272 [I]; 183 [II]
- Vermont, 269 [I]
- Virgin **Islands**, 189 [I]
- Virginia, 163,198,270,313 [I]
- Washington, 159,227,273,285 [I]
- water** allocation
- agricultural **demand** and, 288-289,292-294, 2%, 313 [I]
 - conservation** practices and, 240-244 [I]
 - demand** management and reallocation, 42-43, 44 [I/II]; 210, 235-244, 264 [I]
 - "dry-year" option contracts, 293 [I]
 - institutional** problems, 18 [I/II]; 224-225 [II]
 - marketing and transfer **arrangements**, 32, 42, 4344, 45 [I/II]; 210,235-239,243-244, 264,313,322 [I]
 - pricing **reform**, 21,42 [I/II]; 210,218,235,239-240, 243 [I]

- prior appropriation doctrine, 179,251 [II]
 Sacramento-San **Joaquin** River System, 31,32 [I/II]
 transfers, 18 [I/II]; 225,250,292-293,322 [I]
 Water Bank Program, 279 [I]
 water conservation, 210, 240-244 [I]
 demand management and, 42 [I/II]; 210,240-243,264 [I]
 and drought management, 254 [I]
 economic incentives and disincentives, 240-243,263 [I]
 in Federal facilities, 44 [I/II]; 242 [I]
 interruptible water service programs, 247 [I]
 metering and use restrictions, 301-302 [I]
 municipal programs, 241,242 [I]
 policy options, 242-244 [I]
 pricing **reforms** and, 239-240,243 [I]
 public education and, 240-241,302 [I]
 reclamation and recycling, 43-44 [I/II]; 210, 218, 243, 260-262,264,322 [I]
 seasonal storage **programs**, 247 [I]
 supply management, 244-250 [I]
 tax reforms and, 242-243,322 [I]
 technologies, 242-243,289,301 [I]
 wetlands protection and, 184 [II]
 water quality
 agriculture and, 29, 32 [I/II]; 217, 219, 278-279, 284, 294-296 [I]
 drought and, 215 [I]
 Federal programs, 279 [I]
 fish populations and, 215,219 [I]
 incentive programs, 318 [I]
 legislation, 29 [I/II]; 219,220-221,278-279 [I]
 non-point-source pollution, 215, 220 [I]
 Rio Grande and, 217-218
 thermal pollution, 81 [I/II]; 215,217,227 [I]
 Water Quality Incentives Program, 278-279 [I]
 water **resource** system stress
 population, 214,216 [I]
 water quality, 215-219 [I], 28-29 [I/II]
 environmental needs and, 219 [I]
 reserved water rights, 221-222
 groundwater overdraft, 223-224
 outmoded institutions, 224-225 [I], 18 [I/II]
 aging water infrastructure, 225
 c W change and, 210,212-213 [I], 15 [I/II], 75-78 [I/II]
 Water Resources Council, 249 [I]; 1% [II]
 water rights, 18 [I/II]; 212,221-223,225, 240, 243-X5, 302 [I]; 178,179,251,255 [II]
 water supply augmentation, 257-262 [I]
 reservoirs, 257-259
 desalination, 259-260
 interregional diversions, 260
 wastewater reclamation, 260-262
 water supply management
 coordination, 21,23-25,36,42 [I/II], 210,244-245,263 [I]
 reservoir system management, 245-246 [I]
 conjunctive use, 246 [I]
 analytical tools and forecast systems, 247-248,250,264 [I]
 river basin **commissions**, 249 [I]
 water **resources** council, 289 [I]
 water project reassessment, 249-250 [I]
 groundwater management, 250,301 [I]
 extreme events management, 250-257,262-263 @J
 floods, 253-254,256-257,262-263 [I]
 droughts, 27,42,251-252,254-256, 262-263 [I]
waterfowl, 13,29, 33,34, 126 [I/II]; 235-238,294,301-302 [I]; 155,162,164,183-186, 194,218,221,228 [II]
 watershed management 25,36 [I/II]; 220,225, **244-245**, 249, 250 [I]; 209-210 [II]
 West (U.S.), *see* arid West
 West Virginia, 190,271 [I]
 Western Governor's Association, 243,252 [I]
 Western Water Policy Review, 44 [I/II]; 212,264-265 [I]
 wetlands
 adaptation to climate change, 12,15,111 [I/II]; 172-185 [II]
 agriculture, 26, 28,47 [I/II]; 276, 278,294 [I]; 170-171, 192-193, 199,200 [II]
 @k, 181 [II]
 biodiversity, 167,172, 178, 180, 182-183, 186 [II]
 buffer zones, 192,200 [I]; 207 [II]
 coastal, 9, 12,15,47 [I/II]; 159,190 [I]; 160,169-170,179, 181-183, 186, 194 [II]
 conservation, 278 [I]; 159, 192-193 [II]
 coordination of protective efforts, 48 [I/II]; 191-192, 212-213 [II]
 definition for **regulatory** purposes, 157-158,165 [II]
 distribution, 50 [I/II]; 160-161,168, 170 [II]
 economic issues, 154-155, 162-164, 166, 178, 183 [II]
 extreme events **and**, 172, 175, 176, 183-184 [II]
 Federal programs and legislation, **47-48** [I/II]; 154-159, 187-208,211-212,278 [II]
 fisheries, 81,96 [I/II]; 163-164, 174, 179, 181, 183, 185 [II]
 flood management and, 22,47 [I/II]; 162, 166, 167, 174, 181-183, 186 [II]
 forested, 129, 161 [I/II], 176, 183 [II]
 fragmentation, 25 [I/II], 171-172,176,181,186 [II]
 freshwater nontidal, 160, 168 [II]
 groundwater declines and, 301-302 [I]
 importance, 47 [I/II]; 162-166, 168, 183, 188 [II]
 interagency **task** force, 198 [II]
 inventory, 125, 129 [I/II]; 162, 199, 200 [II]
 land acquisition, 189-190, 194, 198-199,207-209 [II]
 loss, 19,47 [I/II]; 170, 179, 180-181, 184 [II]
 management, 17 [I/II]; 178 [I]; 186-187,208-210 [II]
 mangroves, 160, 175 [II]
 migration, 12,47,93,94,99, 100 [I/II]; 192 [I]; 176, 180, 181, 182,186, 187,206-208 [II]
 mitigation and restoration, 12,48 [I/II]; 221 [I]; 154-155, 174, 188, 190-191, 194,201-206,250 [II]
 monitoring, 23,47,48, 129, 131 [I/II]; 186, 187, 193-194, 199-200,202,208-210, 213 [II]
 "no-net-loss" policy, 5,47 [I/II]; 185-186, 192, 195, 198, 209 [II]
 policy challenges and options, 47-48 [I/II]; 200,201 [I]; 185-186, 195-213 [II]

- prairie potholes, 9, 12, 26, 33-34,47,48 [I/II]; 160-161, 181, 183-184, 186, 190,202,208,278 [II]
- priorities, 21,47 [I/II]; 157-158,206-209 [II]
- protection, 48 [I/II]; 200-202 [I]; 165, 178-179, 184, 195-201 [II]
- research, 23,48-49, 111 ~/II]; 193-195,210-211,213 [II]
- riparian**, 13, 47, 125 [I/II]; 167, 176, 178-179, 181, 184-186,201,202,206 [II]
- salt marshes, 87 [I/II]; 160, 167, 175 [II]
- saltwater intrusion, 176, 182 [II]
- sea level rise and, 9, 12, 19,47 ~/II]; 173-174, 182, 186 [II]
- species adaptation to climate change, 179-181 [II]
- State, 10CS.I and private programs, 195 [II]
- tidal **freshwater** marshes, 160, 175, 182, 188 [II]
- tundra, 13,47,87 [I/II]; 161, 175, 176, 179, 181, 185 [II]
- types, 160-161 [II]
- vegetation, 93, 94 [I/II]; 160-161 [II]
- vulnerable areas, 12, 13,47 [I/II]; 181-185 [II]
- Wetlands Reserve Program, 48 [I/II]; 233,278,318 [I]; 190, 191, 194,202,212,268,287 [II]
- White House Office of Environmental Policy, 196,212 [II]
- wilderness areas, 50 [I/II]; 221,225-227,235,239, 243,246, 251,256,261,263,267, 278,279,282,286 [II]
- wildlife
- adaptation, 92 [I/II]
 - habitat fragmentation, 86 [I/II]
 - management, 192 [II]
 - migration ability, 92-93 [I/II]
 - trapping, 165 [II]
- Wisconsin, 271, 285 [I]
- wise use movement, 178 [I]
- World Meteorological Organization, 71, 103 [I/II]
- Wyoming, 272 [I]; 244 [II]