

---

# TABLE OF CONTENTS

PREFACE TO THE FOURTH EDITION.....	V
PREFACE TO THE THIRD EDITION.....	VII
PREFACE TO THE SECOND EDITION.....	IX
PREFACE TO THE FIRST EDITION.....	XI
ACKNOWLEDGMENTS.....	XV
TABLE OF CASES.....	XLI

## PART 1. BIODIVERSITY

<b>Chapter 1. The Problem of the Delhi Sands Flower-Loving Fly.....</b>	<b>3</b>
Notes & Questions .....	14
<b>Chapter 2. An Overview of Biodiversity.....</b>	<b>17</b>
A. Types of Biodiversity .....	17
Jonathan S. Adams, Bruce A. Stein & Lynn S. Kutner, <i>Biodiversity:     Our Precious Heritage</i> .....	17
Notes & Questions .....	21
Wild Mekong: New Species In 2010 from the Forests, Wetlands and Waters of the Greater Mekong, Asia's Land of Rivers .....	23
Notes & Questions .....	25
B. Why We Care About Biodiversity .....	28
Testimony of Dr. Michael Grever, <i>Medicinal Uses of Plants;     Protection for Plants Under the Endangered Species Act:     Hearing Before the Subcommittee on Environment and Natural     Resources of the House Committee on Merchant Marine and     Fisheries</i> .....	28
Notes & Questions .....	31
Sandra Postel & Stephen Carpenter, <i>Freshwater Ecosystem     Services</i> .....	35
Notes & Questions .....	42
Bruce Babbitt, <i>Between the Flood and the Rainbow: Our Covenant     to Protect the Whole of Creation</i> .....	44
Notes & Questions .....	48
C. Threats to Biodiversity .....	51
Determination of Endangered Status for Five Freshwater Mussels and Threatened Status for Two Freshwater Mussels From the Eastern Gulf Slope Drainages of Alabama, Florida, and Georgia.....	51
Notes & Questions .....	57
The Fund for Animals v. Norton.....	62
Notes & Questions .....	66
<b>Chapter 3. How to Protect Biodiversity .....</b>	<b>69</b>
A. Ways of Protecting Biodiversity.....	70
Defenders of Wildlife v. Salazar.....	70

	Notes & Questions .....	77
	National Audubon Society v. Hester .....	81
	Notes & Questions .....	85
B.	Private Actions to Protect Biodiversity .....	89
	Testimony of Steven J. McCormick, <i>Tax Code Issues and Land</i> <i>Conservation: Hearing Before the Senate Finance Committee</i> .....	89
	Notes & Questions .....	94
	Lujan v. Defenders of Wildlife .....	96
	Notes & Questions .....	100
C.	Constitutional Restraints on Government Regulation of Biodiversity .....	102
	Palazzolo v. Rhode Island.....	102
	Notes & Questions .....	107
	Rancho Viejo, LLC v. Norton .....	110
	Notes & Questions .....	114
D.	State Law Protection of Biodiversity.....	116
	Barrett v. New York .....	116
	Notes & Questions .....	120
	Bolsa Chica Land Trust v. The Superior Court of San Diego County.....	122
	Notes & Questions .....	127
	West v. State .....	130
	Notes & Questions .....	138
E.	Tribal Protection of Biodiversity.....	140
	The Northern Arapahoe Tribe v. Hodel.....	140
	Notes & Questions .....	147

## PART 2. THE ENDANGERED SPECIES ACT

<b>Chapter 4. Identifying Which Species to Protect.....</b>	<b>157</b>	
A.	Identifying Species.....	158
	United States v. Guthrie .....	158
	Notes & Questions .....	161
B.	Identifying Threats to Species .....	166
	Final Rule to List the Illinois Cave Amphipod as Endangered .....	166
	Notes & Questions .....	172
C.	The Listing Decision Process .....	178
	Northern Spotted Owl v. Hodel .....	178
	Notes & Questions .....	181
	Western Watersheds Project v. United States Fish & Wildlife Service.....	184
	Notes & Questions .....	186
D.	Case Study: The Black-Tailed Prairie Dog .....	189
<b>Chapter 5. Federal Government Responsibilities.....</b>	<b>195</b>	
A.	Listing Agency Responsibilities Under the ESA .....	195
	1. Designation of Critical Habitat.....	196
	Weyerhaeuser Company v. United States Fish & Wildlife Service.....	196

Notes & Questions .....	201
Gifford Pinchot Task Force v. United States Fish & Wildlife Service.....	204
Notes & Questions .....	209
2. Development of Recovery Plans .....	211
Strahan v. Linnon .....	211
Notes & Questions .....	214
Recovery Plan for Five Plants from Monterey County, California .....	215
Notes & Questions .....	219
Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico .....	221
Notes & Questions .....	226
B. Responsibilities of All Federal Agencies Under the ESA.....	230
1. The Conservation Duty.....	231
The Hawksbill Sea Turtle v. Federal Emergency Management Agency.....	231
Notes & Questions .....	232
2. The Duty to Avoid Causing Jeopardy .....	235
Karuk Tribe of California v. United States Forest Service .....	235
Notes & Questions .....	247
Tennessee Valley Authority v. Hill .....	248
Notes & Questions .....	258
Arizona Cattle Growers' Association v. United States Fish & Wildlife Service.....	262
Notes & Questions .....	272
<b>Chapter 6. The Take Prohibition .....</b>	<b>277</b>
A. Poaching, Smuggling, and Direct Takings of a Listed Species .....	278
United States v. Clavette .....	278
Notes & Questions .....	280
United States v. Billie.....	283
Notes & Questions .....	289
United States v. Winnie .....	291
Notes & Questions .....	292
United States v. One Handbag of Crocodilus Species .....	293
Notes & Questions .....	296
B. Habitat Destruction and Indirect Taking of Endangered Species.....	297
1. The Scope of the Take Prohibition .....	298
Babbitt v. Sweet Home Chapter of Communities for a Great Oregon.....	298
Notes & Questions .....	307
United States v. Town of Plymouth, Massachusetts .....	309
Notes & Questions .....	314
2. Authorizing Incidental Take of Protected Species .....	318
Friends of Endangered Species, Inc. v. Jantzen .....	318
Notes & Questions .....	322

Wisconsin Statewide Karner Blue Butterfly Habitat Conservation Plan and Environmental Impact Statement .....	324
Notes & Questions .....	332
3. The Debate over the ESA .....	335
Removal of <i>Echinacea tennesseensis</i> (Tennessee Purple Coneflower) From the Federal List of Endangered and Threatened Plants.....	335
Notes & Questions .....	339

### PART 3. MANAGING ECOSYSTEM DIVERSITY

<b>Chapter 7. Introduction to Ecosystem Management Law .....</b>	<b>347</b>
A. What Is an Ecosystem?.....	353
1. Scientific Perspectives .....	356
John M. Blair, Scott L. Collins & Alan K. Knapp, <i>Ecosystems As Functional Units in Nature</i> .....	356
Notes & Questions .....	360
2. Policy Perspectives.....	364
James Salzman, <i>Valuing Ecosystem Services</i> .....	365
Notes & Questions .....	368
B. What Is Ecosystem Management?.....	370
1. Metrics Selection.....	371
James Salzman, <i>Valuing Ecosystem Services</i> .....	372
Notes & Questions .....	374
2. Goal Selection.....	375
Notes & Questions .....	379
3. Method Selection.....	382
Notes & Questions .....	387
J.B. Ruhl, <i>The Disconnect Between Environmental Assessment and Adaptive Management</i> .....	389
Notes & Questions .....	393
C. What Is Ecosystem Management Law?.....	394
Ecosystem Management Act of 1995 (S. 2189) .....	395
Notes & Questions .....	398
1. Changing the Focus of Existing Laws .....	399
Congressional Research Service, <i>Ecosystem Management: Federal Agency Activities</i> .....	400
General Accounting Office, <i>Ecosystem Management: Additional Actions Needed to Test a Promising Approach</i> .....	402
Notes & Questions .....	403
U.S. Environmental Protection Agency, <i>Ecosystem Protection Workgroup, Toward a Place-Driven Approach: The Edgewater Consensus on an EPA Strategy for Ecosystem Protection</i> .....	404
Notes & Questions .....	407

2.	Designing New Law to Apply .....	408
a.	Legislative Initiatives .....	409
	James Salzman, <i>Valuing Ecosystem Services</i> .....	409
	Notes & Questions.....	411
b.	A Role for the Common Law? .....	416
	J.B. Ruhl, <i>Ecosystem Services and the Common Law of</i> <i>“The Fragile Land System”</i> .....	416
	Notes & Questions.....	419
D.	Case Study: National Wildlife Refuge System Policy.....	421
	Department of the Interior, <i>Policy on Maintaining the Biological</i> <i>Integrity, Diversity, and Environmental Health of the</i> <i>National Wildlife Refuge System</i> .....	425
	Notes & Questions .....	433
<b>Chapter 8. Forest Ecosystems .....</b>		<b>439</b>
A.	Biodiversity and Forest Ecosystems .....	439
	Notes & Questions .....	441
B.	Primer on the Law of Forests.....	443
	Notes & Questions .....	449
C.	Biodiversity Management in Forest Ecosystems.....	451
1.	Public Lands: National Forests and the Biodiversity	
	Mandate .....	452
a.	Choosing Science .....	455
	Sierra Club v. Marita .....	455
	Notes & Questions.....	463
b.	Assessing Impacts .....	464
	Ecology Center, Inc. v. Austin .....	465
	The Lands Council v. McNair.....	467
	Notes & Questions.....	475
c.	Planning to Achieve Ecological Sustainability.....	477
	Committee of Scientists, Sustaining the People’s Lands: Recommendations for Stewardship of the National Forests and Grasslands Into the Next Century .....	478
	Notes & Questions.....	481
	U.S. Forest Service, <i>Department of Agriculture, National</i> <i>Forest System Land and Resource Management</i> <i>Planning; Final Rule</i> .....	485
	Notes & Questions.....	503
	The Federal Forest Reserve Coalition v. Forest Service ...	504
	Notes & Questions.....	511
	Note on Ecosystem Management in State-Owned Forest Lands.....	513
2.	Private Lands: Integrated Approaches.....	514
	Notes & Questions .....	521
D.	Case Study: The Shawnee National Forest in Southern Illinois.....	523
	Notes & Questions .....	525
<b>Chapter 9. Grassland Ecosystems .....</b>		<b>529</b>
A.	Biodiversity and Grassland Ecosystems .....	529

	Notes & Questions .....	531
B.	Primer on the Law of Grasslands .....	532
	Public Lands Council v. Babbitt .....	533
	Notes & Questions .....	537
	Department of the Interior, Bureau of Land Management, <i>Department Hearings and Appeals Procedures; Cooperative Relations; Grazing Administration—Exclusive of Alaska</i> .....	539
	Notes & Questions .....	542
C.	Biodiversity Management in Grassland Ecosystems .....	545
	1. BLM’s Rangeland Management Policies .....	545
	a. The Fundamentals of Rangeland Health .....	545
	Department of the Interior, Bureau of Land Management, <i>Department Hearings and Appeals Procedures;         Cooperative Relations; Grazing Administration—         Exclusive of Alaska</i> .....	546
	Notes & Questions .....	549
	Public Lands Council v. Babbitt .....	553
	Notes & Questions .....	557
	Western Watersheds Project v. Kraayenbrink .....	559
	Notes & Questions .....	566
	Note on Grazing Preference “Buyouts” .....	568
	b. Wilderness Study Areas .....	570
	Norton v. Southern Utah Wilderness Alliance .....	572
	Notes & Questions .....	576
	c. Other Planning Requirements .....	576
	Norton v. Southern Utah Wilderness Alliance .....	576
	Notes & Questions .....	579
	National Wildlife Federation v. Bureau of Land Management .....	580
	Notes & Questions .....	585
	d. Compensatory Mitigation .....	586
	United States Department of the Interior, Bureau of Land Management Instruction Memorandum 2019–018 .....	590
	Notes & Questions .....	595
	Note on Forest Service Management of the National Grasslands System .....	596
	2. Restoring Grassland Ecosystems on Private Lands .....	598
	The Nature Conservancy and the United States Fish & Wildlife Service, Montana Greater Sage-grouse and Declining Grassland Songbirds Programmatic Candidate Conservation Agreement with Assurances for Greater Sage-grouse and Baird’s Sparrow, Chestnut-collared Longspur, McCown’s Longspur, and Sprague’s Pipit .....	599
	Notes & Questions .....	601
	Natural Resources Conservation Service, Grazing Lands Conservation Initiative, Strategic Plan 2010–2015 .....	603
	Notes & Questions .....	605

D.	Case Study: The Little Darby Prairie National Wildlife Refuge .....	606
	U.S. Fish and Wildlife Service, Region 3, <i>Midwest Celebrates Its Newest National Prairie Refuge, Public Invited To Dedication,</i> Friday, Aug. 10, 2001 at 4 p.m. ....	606
	U.S. Fish & Wildlife Service, <i>Notice of Intent to Prepare an Environmental Impact Statement (EIS) for the Proposed Establishment of the Little Darby National Wildlife Refuge</i> .....	607
	Stewards of the Darby (SOD) and Citizens Against Refuge Proposal (CARP), Declaration: “Our Land Is Our Responsibility” .....	609
	Notes & Questions .....	610
	<b>Chapter 10. Freshwater Ecosystems .....</b>	<b>613</b>
A.	Biodiversity and Freshwater Ecosystems .....	613
	Notes & Questions .....	621
B.	Primer on the Law of Freshwater Resources .....	623
	Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers.....	623
	Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West .....	629
	Notes & Questions .....	632
	Note on Water Rights .....	633
C.	Biodiversity Management in Freshwater Ecosystems .....	637
1.	Groundwater .....	638
	Cappaert v. United States .....	638
	Notes & Questions .....	645
	Hawai'i Wildlife Fund v. County of Maui .....	648
	Notes & Questions .....	658
2.	Lakes and Rivers.....	660
a.	Clean Water Act .....	660
	(1) NPDES Permits.....	661
	South Florida Water Management District v. Miccosukee Tribe of Indians .....	662
	Notes & Questions.....	670
	(2) The Total Maximum Daily Load Program.....	671
	Pronsolino v. Nastri.....	673
	Notes & Questions.....	683
b.	Wild and Scenic Rivers .....	688
	Oregon Natural Desert Association v. Singleton .....	689
	Notes & Questions.....	696
3.	Wetlands .....	699
a.	Boundaries.....	700
	U.S. Army Corps of Engineers and U.S. Environmental Protection Agency Fact Sheet, Proposed Revised Definition of Waters of the United States: Key Proposed Changes .....	705
	Orchard Hill Building Company v. United States Army Corps of Engineers .....	710
	Notes & Questions.....	718

	Notes & Questions.....	721
b.	Regulated Discharges .....	724
	National Association of Home Builders v. U.S. Army Corps of Engineers .....	725
	Notes & Questions.....	729
c.	Permitting and Mitigation.....	730
	(1) Regional Permitting .....	732
	Sierra Club v. United States Army Corps of Engineers .....	732
	Notes & Questions.....	738
	(2) Mitigating Banking.....	741
	U.S. Army Corps of Engineers and Environmental Protection Agency, Compensatory Mitigation for Losses of Aquatic Resources, Final Rule .....	741
	Notes & Questions.....	747
4.	Watersheds.....	749
	a. Theme .....	750
	William E. Taylor & Mark Gerath, <i>The Watershed Protection Approach: Is the Promise About to Be Realized?</i> .....	750
	Notes & Questions.....	754
	b. Approaches .....	756
	Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Department of the Interior, Environmental Protection Agency, Tennessee Valley Authority, Army Corps of Engineers, <i>Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management</i> .....	756
	U.S. Environmental Protection Agency, Office of Water, <i>Draft Framework for Watershed-Based Trading</i> .....	760
	Notes & Questions.....	764
	U.S. Environmental Protection Agency, <i>Updating the Environmental Protection Agency's (EPA) Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality</i> .....	768
	Notes & Questions.....	772
	c. Ecosystem Management Applications .....	773
	Barton H. Thompson, Jr., <i>Markets for Nature</i> .....	773
	Notes & Questions.....	777
	Pacific Coast Federation of Fishermen's Associations, Inc. v. National Marine Fisheries Service .....	778
	Notes & Questions.....	780
D.	Case Study: The Apalachicola-Chattahoochee-Flint River Basin	
	Water Wars .....	782
	Notes & Questions .....	787
	Notes & Questions .....	789
	Florida v. Georgia .....	790
	Notes & Questions .....	803



<b>Chapter 11. Coastal and Marine Ecosystems .....</b>	<b>805</b>
A. Biodiversity in Coastal and Marine Ecosystems .....	805
Notes & Questions .....	810
B. Primer on the Law of Coastal and Marine Ecosystems .....	812
Executive Order 13547, Stewardship of the Ocean, Our Coasts, and the Great Lakes .....	818
Notes & Questions .....	825
C. Biodiversity Management in Coastal and Marine Ecosystems .....	829
1. Beaches and Coastal Lands.....	830
a. State Land Management Frameworks .....	831
Kirkorowicz v. California Coastal Commission.....	832
Notes & Questions.....	836
b. Federal Agency Consistency.....	839
California Coastal Commission v. United States.....	839
Notes & Questions.....	844
Note on the Public Trust Doctrine .....	849
2. Estuaries.....	855
a. The National Estuary Program.....	856
Matthew W. Bowden, <i>An Overview of the National</i> <i>Estuary Program</i> .....	857
Notes & Questions.....	861
b. The Clean Water Act.....	864
Harry R. Hughes & Thomas W. Burke, Jr., <i>The Cleanup</i> <i>of the Nation's Largest Estuary: A Test of Political</i> <i>Will</i> .....	865
Notes & Questions.....	871
U.S. Environmental Protection Agency, <i>Chesapeake Bay</i> <i>Total Maximum Daily Load for Nitrogen,</i> <i>Phosphorus and Sediment</i> .....	874
American Farm Bureau Federation v. United States Environmental Protection Agency .....	878
Notes & Questions.....	891
c. Water Management Planning .....	892
Delta Stewardship Council, <i>Final Staff Draft of the</i> <i>Delta Plan</i> .....	894
Notes & Questions.....	898
d. The Common Law .....	898
Avenal v. State .....	899
Notes & Questions.....	907
Note on Hypoxia in Coastal Waters.....	909
3. Living Resources .....	916
a. Fisheries Management .....	916
United Nations Food and Agriculture Organization, <i>Code of Conduct for Responsible Fisheries</i> .....	917
Notes & Questions.....	918
(1) Regulating Fish Harvests .....	919
Coastal Conservation Commission v. Gutierrez.....	922
Notes & Questions.....	929
Natural Resources Defense Council, Inc. v. Daley.....	930

	Notes & Questions.....	937
(2)	Tradeable Permits.....	941
	Shi-Ling Hsu & James E. Wilen, <i>Ecosystem Management and the 1996 Sustainable Fisheries Act</i> .....	941
	Notes & Questions.....	944
(3)	Bycatch.....	945
	Madeline June Kass, <i>Alaskan Halibut: A Bycatch Trifecta</i> .....	946
	Notes & Questions.....	950
(4)	International Standards.....	951
	United Nations Food and Agriculture Organization, <i>Code of Conduct for Responsible Fisheries</i> .....	951
	Notes & Questions.....	955
	Note on Aquaculture.....	957
(5)	Protecting Fish Habitat.....	961
	Department of Commerce, <i>National Marine Fisheries Service, Magnuson-Stevens Act Provisions; Essential Fish Habitat (EFH)</i> .....	963
	Notes & Questions.....	966
	Note on the Marine Mammal Protection Act.....	968
b.	Marine Protected Areas.....	971
	Executive Order 13158, Marine Protected Areas.....	973
	Notes & Questions.....	976
D.	Case Study: The Plight of the White Marlin.....	983
	Department of Commerce, National Marine Fisheries Service (NMFS), <i>90-Day Finding for a Petition to List Atlantic White Marlin</i> .....	985
<b>Chapter 12. Fragile Ecosystems .....</b>		<b>993</b>
A.	Arctic Ecosystems.....	993
	National Parks & Conservation Association v. Babbitt.....	994
	Notes & Questions.....	1002
	National Research Council, <i>The Bering Sea Ecosystem</i> .....	1003
	Notes & Questions.....	1008
	Native Village of Point Hope v. Salazar.....	1010
	Notes & Questions.....	1017
	Izembek National Wildlife Refuge, <i>Land Exchange/Road Corridor Draft Environmental Impact Statement, Executive Summary</i> .....	1022
	Notes & Questions.....	1025
B.	Desert Ecosystems.....	1027
	Sierra Club v. Clark.....	1028
	Notes & Questions.....	1031
	Western Watersheds Project v. Salazar.....	1032
	Notes & Questions.....	1045
	Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan, Wilderness Stewardship Plan & Environmental Impact Statement.....	1048

---

Notes & Questions .....	1054
C. Island Ecosystems.....	1056
Morimoto v. Board of Land and Natural Resources .....	1057
Notes & Questions .....	1062
National Parks & Conservation Association v. U.S. Department of Transportation .....	1065
Notes & Questions .....	1072
Kiawah Development Partners, II v. South Carolina Department of Health and Environmental Control .....	1076
Notes & Questions .....	1087
D. Coral Reef Ecosystems.....	1089
Establishment of the Virgin Islands Coral Reef National Monument.....	1090
Notes & Questions .....	1093
Programmatic Environmental Impact Statement for the Coral Reef Conservation Program; Notice of Intent; Scoping Period Announcement National Oceanic and Atmospheric Administration .....	1095
Notes & Questions .....	1098
<b>Chapter 13. Human-Dominated Ecosystems .....</b>	<b>1101</b>
A. Urban Areas .....	1101
Heffernan v. Missoula City Council.....	1102
Notes & Questions .....	1106
Utahns for Better Transportation v. United States Department of Transportation .....	1108
Notes & Questions .....	1117
National Wildlife Federation v. Babbitt.....	1117
Notes & Questions .....	1122
Detroit River International Wildlife Refuge Comprehensive Conservation Plan.....	1123
Notes & Questions .....	1129
Chicago Wilderness and Its Biodiversity Recovery Plan .....	1130
Notes & Questions .....	1137
B. Agricultural Lands.....	1138
Christopher R. Kelley and James A. Lodoen, <i>Federal Farm         Program Conservation Initiatives: Past, Present, and         Future</i> .....	1140
Wildlife Habitat Incentive Program .....	1147
Notes & Questions .....	1151
In re Freshwater Wetlands Protection Act Rules .....	1152
Notes & Questions .....	1160
C. Recreational Areas.....	1161
Mausolf v. Babbitt.....	1162
Notes & Questions .....	1166
Florida Marine Contractors v. Williams .....	1167
Notes & Questions .....	1175

Sierra Club v. Commissioner of the Department of Environmental Management .....	1176
Notes & Questions .....	1183
D. Case Study: Cape Hatteras National Seashore .....	1184

#### PART 4. GLOBAL BIODIVERSITY

<b>Chapter 14. Domestic Laws .....</b>	<b>1195</b>
A. Reliance upon Each Country's Own Domestic Laws .....	1195
1. China.....	1196
a. China's Biodiversity .....	1196
b. China's Efforts to Protect Its Biodiversity.....	1200
Notes & Questions.....	1207
B. Extraterritorial Application of Domestic Environmental Laws .....	1208
Asian Elephant Conservation Act of 1997 .....	1208
Notes & Questions .....	1212
Listing Six Foreign Birds as Endangered Throughout Their Range .....	1214
Notes & Questions .....	1228
Defenders of Wildlife v. Lujan .....	1228
Notes & Questions .....	1232
United States-Import Prohibition of Certain Shrimp and Shrimp Products .....	1234
Notes & Questions .....	1240
<b>Chapter 15. International Law .....</b>	<b>1243</b>
A. Treaties.....	1244
Statement of Dr. William T. Hornaday, Investigation of the Fur-Seal Fisheries: Hearing Before the Senate Committee on Conservation of National Resources on Bill (S. 7242) Entitled "An Act to Protect the Seal Fisheries of Alaska, and for Other Purposes" .....	1244
Notes & Questions .....	1248
B. The Convention on International Trade in Endangered Species .....	1255
Testimony of John E. Scanlon, Secretary-General of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): "Ivory and Insecurity: The Global Implications of Poaching in Africa" .....	1255
Notes & Questions .....	1261
C. The Convention on Biological Diversity .....	1263
United Nations Conference on Environment and Development: Convention on Biological Diversity.....	1263
Notes & Questions .....	1277
D. Customary Law .....	1282
Beanal v. Freeport-McMoran, Inc.....	1282
Notes & Questions .....	1285

**PART 5. MAJOR THREATS TO BIODIVERSITY  
AND ECOSYSTEMS**

<b>Chapter 16. Invasive Species.....</b>	<b>1293</b>
A. An Introduction to the Invasive Species Problem and Its Regulation .....	1293
Jane Cynthia Graham, <i>Snakes on a Plain, or in a Wetland: Fighting Back Invasive Nonnative Animals—Proposing a Federal Comprehensive Invasive Nonnative Animal Species Statute</i> .....	1294
Notes & Questions .....	1305
Executive Order 13112, Invasive Species.....	1307
Invasive Species Definition Clarification and Guidance White Paper .....	1312
2016–2018 National Invasive Species Management Plan .....	1322
Notes & Questions .....	1327
Invasive Plant Management Program 2019 Work Plan.....	1330
B. The Ballast-Water Cases: A Survey of the Application of Existing Laws to Invasive Species .....	1338
Northwest Environmental Advocates v. United States Environmental Protection Agency .....	1338
Fednav, Ltd. v. Chester .....	1345
San Francisco Baykeeper v. United States Army Corps of Engineers.....	1357
Notes & Questions .....	1370
C. Invasive Species and Climate Change.....	1372
David A. Striffling, <i>An Ecosystem-Based Approach to Slowing the Synergistic Effects of Invasive Species and Climate Change</i> .....	1372
 <b>Chapter 17. Climate Change and Its Impact on Biodiversity .....</b>	 <b>1387</b>
A. Introduction to Anthropogenic Climate Change.....	1387
Climate Change 2014 Synthesis Report, <i>Summary for Policymakers</i> .....	1390
Notes & Questions .....	1400
R.T. Pierrehumbert, <i>Climate Change: A Catastrophe in Slow Motion</i> .....	1403
Notes & Questions .....	1409
Anthony Leiserowitz, Edward Maibach, Connie Roser-Renouf & Nicholas Smith, <i>Global Warming’s Six Americas in May 2011</i> .....	1415
B. Impacts on Biodiversity and Ecosystems .....	1419
Thomas R. Karl, Jerry M. Melillo, & Thomas C. Peters eds., <i>Global Climate Change Impacts in the United States</i> .....	1420
Notes & Questions .....	1431
Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change.....	1432
Notes & Questions .....	1436
C. Problem Areas in Focus.....	1436
1. Arctic and Antarctic Regions.....	1436

	Dr. Ahmed Djoghlaifa, <i>Climate Change and Biodiversity in Polar Regions</i> .....	1437
	Center for Biological Diversity v. Lubchenco.....	1439
	Andrew Clarke, <i>Climate Change and the Antarctic Marine Ecosystem</i> .....	1440
2.	Fisheries .....	1442
	Natural Resources Defense Council v. Kempthorne.....	1442
3.	Forests .....	1447
	Herman Shugart et al., <i>Forests &amp; Global Climate Change: Potential Impacts on U.S. Forest Resources</i> .....	1447
4.	Endangered Species Act Listing Process.....	1451
	Endangered and Threatened Wildlife and Plants; Emergency Listing of the Miami Blue Butterfly as Endangered, and Emergency Listing of the Cassius Blue, Ceraunus Blue, and Nickerbean Blue Butterflies as Threatened Due to Similarity of Appearance to the Miami Blue Butterfly, Part II.....	1451
	Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Nueces River and Plateau Shiners as Threatened or Endangered .....	1456
D.	Biodiversity and Geoengineering in Response to Climate Change.....	1459
	Impacts of Climate-Related Geoengineering on Biological Diversity .....	1459
	Notes & Questions .....	1466
	<b>Chapter 18. Biodiversity and Climate Mitigation.....</b>	<b>1469</b>
A.	What Is Climate Mitigation?.....	1469
	Climate Change Mitigation: What Do We Do? .....	1471
	Notes & Questions .....	1476
B.	Is the Endangered Species Act a Viable Tool for Mitigation of GHG Emissions? .....	1476
	Matthew Gerhart, <i>Climate Change and the Endangered Species Act: The Difficulty of Proving Causation</i> .....	1477
	Notes & Questions .....	1485
	J.B. Ruhl, <i>Climbing Mount Mitigation: A Proposal for Legislative Suspension of Climate Change “Mitigation Litigation”</i> .....	1488
	Notes & Questions .....	1494
C.	The Current Federal Approach to Endangered Species and Climate Mitigation.....	1494
	United States Department of the Interior, Fish and Wildlife Service, Memorandum of May 14, 2008 .....	1495
	Notes & Questions .....	1497
	Remarks by Secretary Kempthorne .....	1497
	Notes & Questions .....	1500
	In Re Polar Bear Endangered Species Act Listing and Section 4(d) Rule Litigation.....	1501
	In Re Polar Bear Endangered Species Act Listing and § 4(d) Rule Litigation .....	1508

Notes & Questions .....	1518
D. Climate Mitigation Through Renewable Energy: Conflicts with Endangered Species .....	1521
Animal Welfare Institute v. Beech Ridge Energy .....	1522
Notes & Questions .....	1530
Julie Cart, <i>Saving Desert Tortoises is a Costly Hurdle for Solar Projects: Brightsource Energy Has Spent \$56 Million So Far To Protect the Threatened Creatures, But Calamities Have Befallen the Effort</i> .....	1531
Notes & Questions .....	1535
Alabama Power Company v. Federal Energy Regulatory Commission .....	1538
Notes & Questions .....	1543
Kalyani Robbins, <i>Awakening the Slumbering Giant: How Horizontal Drilling Technology Brought the Endangered Species Act to Bear on Hydraulic Fracturing</i> .....	1544
Notes & Questions .....	1553
<b>Chapter 19. Biodiversity and Climate Adaptation.....</b>	<b>1555</b>
A. What Is Climate Adaptation?.....	1555
William E. Eastering III, Brian H. Hurd & Joel B. Smith, <i>Coping with Global Climate Change: The Role of Adaptation in the United States</i> .....	1556
Notes & Questions .....	1559
Robin Kundis Craig, “Stationarity Is Dead”—Long Live <i>Transformation: Five Principles for Climate Change Adaptation Law</i> .....	1562
Alejandro E. Camacho, <i>Adapting Governance to Climate Change: Managing Uncertainty through a Learning Infrastructure</i> .....	1568
Notes & Questions .....	1574
Matthew D. Zinn, <i>Adapting to Climate Change: Environmental Law in a Warmer World</i> .....	1574
Notes & Questions .....	1577
B. The Tools of the Adaptation Trade: Ecosystem Resilience, Adaptive Management, and Assisted Migration .....	1578
1. Ecosystem Resilience .....	1578
Robert L. Glicksman, <i>Ecosystem Resilience to Disruptions Linked to Global Climate Change: An Adaptive Approach to Federal Land Management</i> .....	1580
2. Adaptive Management.....	1587
Holly Doremus et al., <i>Making Good Use of Adaptive Management</i> .....	1587
Notes & Questions .....	1592
3. Assisted Migration .....	1592
Alejandro E. Camacho, <i>Assisted Migration: Redefining Nature and Natural Resource Law under Climate Change</i> .....	1592
Notes & Questions .....	1604

4.	Bringing It All Together in the Florida Everglades, a Case Study.....	1605
	Center for Biological Diversity v. Salazar .....	1606
5.	Letting Go of the Past.....	1622
	Alejandro E. Camacho, Holly Doremus, Jason S. McLachlan & Ben A. Minter, <i>Reassessing Conservation Goals in a Changing Climate</i> .....	1623
	Notes & Questions .....	1628
C.	The Federal Approach to Adapting Wildlife and Ecosystems to Climate Impacts.....	1629
1.	The Endangered Species Act and Climate Adaptation .....	1629
	J.B. Ruhl, <i>Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future</i> .....	1629
	Notes & Questions .....	1632
	Pacific Coast Federation of Fishermen's Associations v. Gutierrez.....	1633
2.	Inter-Agency Planning for Ecosystems and Climate Adaptation .....	1644
	U.S. Global Change Research Program (USGCRP), <i>Preliminary Review of Adaptation Options for Climate- Sensitive Ecosystems and Resources</i> .....	1644
	Notes & Questions .....	1650
	The National Fish, Wildlife and Plants Climate Adaptation Strategy: Public Review Draft.....	1650
	INDEX .....	1655