

# STATE OF THE STATES: GEOGRAPHIC PATTERNS OF DIVERSITY, RARITY, AND ENDEMISM BURCE A. STEIN . ET AL.] pdf

## 1: Precious Heritage : The Status of Biodiversity in the United States (, Hardcover) | eBay

*missing species of the United States --Appendix B. State diversity, endemism, and rarity --Appendix C. K uchler potential natural vegetation types --Appendix D. Principal sources for U.S. species names in the Natural Heritage central databases.*

Our Precious Heritage, Jonathan S. Stein, and Lynn S. Discovering Life in America: Stein and Frank W. Conservation Status of U. State of the States: The Geography of Imperilment: More than the Sum of the Parts: Leading Threats to U. Strategies for Biodiversity Protection, Michael J. Owing Up to Our Responsibilities: Who Owns Lands Important for Biodiversity? Shaffer and Bruce A. Extinct and missing species of the United States Appendix B: A first-rate effort, offered at a rather low suggested retail price to boot! Very highly recommended, both as general private reading and as a reference source for professionals. By documenting the presence in America of more than , native species--double the previous estimate--Precious Heritage highlights the U. A single river in Tennessee, for example, contains more fish species than are found in all of Europe. The study also reveals the U. It is certain to be the definitive text on U. It combines accessibility for a broad readership, authoritative encyclopedic coverage, and excellent writing and illustrations. I will be pulling it off my shelf constantly, and recommending it widely. They invite us to turn inward, not by abandoning global conservation but by conserving our own fauna and flora in a manner that will set a shining example for the rest of the world. Wilson "Overall, the book is engagingly written, lavishly illustrated both with photos and maps that display the results of the analyses, and peppered with detailed examples of the species and communities that are the focus of our conservation concern. It is also extremely well edited. Although it has over 25 authors, the book reads with a common voice and consistent style. I can think of no other data-rich reference book that also provides anecdotes about Louis Agassiz, J. Audubon, the Bartrams, Lewis and Clark, and Phil Pister [I]t will make a welcome addition to the library of anyone interested in any aspect of conservation in the United States, including those who are responsible for managing natural areas. The editors have arranged the contents of the work in a manner providing a handbook-like review of the status of US biodiversity, and they have overseen the production of a book that can be understood by almost any intelligent person from the age of 13 up--no small feat. Wilson; three particularly helpful appendixes Chapter subject areas range from biodiversity as heritage through strategies for biodiversity protection. All in all, a first rate effort, offered at a rather low suggested retail price to boot! They identify several biological hot spots from Hawaii to the Southern Appalachians that present critical opportunities for preserving threatened fauna and flora. The volume also considers the scale of habitat conservation that will be required to protect not only individual taxa but entire ecological systems. The Status of Biodiversity in the U. Tersely put, our economic activities. This mass extinction is of major concern for the survival of our civilization because it is biodiversity that provides our food, purifies our water, creates fertile soil, provides the air we breathe, and much more. McDaniel, Professor of Biology, Rensselaer Polytechnic Institute, Troy "This comprehensive [and extremely handsome] book analyzes patterns of biological diversity in the U. After many chapters dedicated to this thorough exposition, Precious Heritage culminates its American journey by offering concrete suggestions for safeguarding the natural heritage that is described and beautifully photographed throughout this valuable book. In its totality, Precious Heritage offers readers an invaluable education in U. The writing is interesting, the layout is attractive, the photographs are excellent although I wish that some had been larger , and the paper is of high quality. I highly recommend this book for general reading, for college courses, and for persuading legislators of the opportunities for protecting unique, wonderful, and vulnerable species and ecosystems in the United States. Although it has over 25 authors, the book reads with a common voice and consistent style. I can think of no other data-rich reference book that also provides anecdotes about Louis Agassiz, J. Audubon, the Bartrams, Lewis and Clark, and Phil Pister [I]t will make a welcome addition to the library of anyone interested in any aspect of conservation in the United States, including those who are responsible for

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managing natural areas. In a very accessible format -- clearly written text accompanied by numerous figures, maps, charts and tables -- Precious Heritage explains how the data has been collected and analyzed, indicates what it can tell us, and provides avenues for preservation.

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2: Limits to the use of threatened species lists | Hugh Possingham - [www.enganchecubano.com](http://www.enganchecubano.com)

5 *State of the States: Geographic Patterns of Diversity, Rarity, and Endemism* Bruce A. Stein et al. 6 *The Geography of Imperilment: Targeting Conservation towards Critical Biodiversity Areas* Stephen J. Chaplin et al.

Alan Weakley *Applied Vegetation Science* 9: Endemic areas in North America Question: The southeastern Coastal Plain of North America, understanding this unevenness for scientific and applied focusing primarily on the imperiled *Pinus palustris* longleaf pine ecosystem. One common and valuable ap- Methods: We documented the high level of plant endemism approach to measuring biodiversity and studying patterns in the region, and characterized the endemic taxa into distribu- of biodiversity distribution is to analyse geographic tional subregions. A total of plant taxa are endemic to the Coastal logical diversity see for instance Barthlott et al. In North America, recent efforts to look at pat- geographical subregions within the Coastal Plain, with patterns of plant endemism include Stein et al. For their purposes, these authors have described Conclusions: This pattern of local endemism presents chal- lenges in conserving the full biota of the region: We propose that subspecies and varieties. Kartesz includes in- the dispersed distribution of endemic species will require a formation on North American endemics by state and mixture of large core reserves and smaller satellite reserves. Biodiversity; Biogeography; Florida; Longleaf tailed information on the endemism of a given floristic pine; Mid-Atlantic Coastal Plain; Southeastern North Ameri- province or ecoregion has been difficult to ascertain, can Coastal Plain. Kartesz with minor exceptions and The state of California is justifiably famous as one of modifications and updates from the taxonomic literature. Another area frequently cited as an area of sub- stantial endemism in North America is the Appalachian Mountain region. Southern Appalachians southern Pennsylvania to north- understudied and undervalued from a conservation per- ern Georgia. The Ozark-Ouachita Mountain region, spective. In this paper we more thoroughly assess and famous for disjunct taxa, harbours no endemic plant document endemism in the Coastal Plain, look at geo- genera and 31 endemic taxa Zollner in prep. In the graphical patterns within it, and, focusing on the *Pinus* Pacific Northwest, Thorne estimated at least 11 *palustris* ecosystem, assess the conservation implica- endemic plant genera and over species in the tions of the distribution of endemics in this province. Be- Weakley by additional review of the taxonomic cause of repeated Pleistocene inundations, it has a young and floristic literature covering southeastern North flora recruited largely from the more ancient Appala- America. The literature reviewed includes major floris- chian Province, and to a lesser extent from the West tic works and checklists Gann et al. Although many of the ; Radford et al. We have also conducted supplementary natural physiographic regions. While regarded private herbaria to verify distributions to the county by many as biologically diverse, the Coastal Plain lacks level of the rarer Coastal Plain taxa " those ranked G1, region-wide documentation of its flora and fauna. However, conservation planning Groves We characterized each of the endemic species as to whether they are obligately associated with the *Pinus palustris* ecosystem, defined as being taxa that are restricted to P. As our primary interest was the P. The Coastal Plain stippled area of southeastern North example, we then assessed the degree to which large America, defined by the inland junction of Cretaceous depos- federal and state conservation areas successfully cap- its with older Paleozoic formations. Despite its relative geological youth early Ter- tiary, ca. Ocean inundations have also been a feature of Weakley , taxa " species and Coastal Plain evolution, but not all of the region was additional infraspecific taxa " plus 48 endemic gen- covered during any one advance. Thus, for very long era, are unique to the North American Coastal Plain. We think it Plain, the rate of endemism would be The work of describ- era could have originated anywhere but on the Coastal ing new taxa has continued unabated during the past Plain. As climatic changes have high numbers of native plants and endemics. The occurred, these periodic immigrations from all direc- Coastal Plain has few obvious geographic dividers, tions have provided genetic stock for speciation. Un- has very subdued topography the maximum eleva- doubtedly many of these immigrants later became tion is less than m , is of relative geologic youth extinct, but others have persisted in a small area or substrates are

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mostly unconsolidated sediments de- spread more generally in the Coastal Plain. The geographi- Plain flora can be identified, including: Soil diversity is high: Soil stricted, or nearly so. For example, the Lake Wales pH an important though crude indicator of plant Ridge in the central Florida peninsula supports 37 substrates varies from 3 to 8. Soil textures include taxa which are found nowhere else Huck et al. Plant communities reflect a very broad range of Thus, we here recognize eight subregions 3. Many plant communities have been shaped by within the Coastal Plain, plus two major disjunct frequently recurring fire " the Coastal Plain has the areas which are presented in the following text-table: Narrowness of endemism of the Coastal Plain ginia to southern South Carolina. South Atlantic Coastal Plain, from central Georgia to system. The second column tallies the number of taxa which northern peninsular Florida. Temperate central Florida peninsula including the Lake Wales Ridge. Subtropical southern Florida peninsula. Descriptions of the associated plant communities 8. Southern Texas to eastern Tamaulipas, Mexico the and overviews of the ecology of P. Appalachian bogs, Great Lakes shores, etc. The Pinus palustris ecosystem encompasses a West Indies disjuncts especially the northern Baha- broad range of community types, ranging from xeric mas, and northwestern Cuba , Central America espe- Pinus-Quercus scrub to mesic flatwoods and wet savan- cially Belize , and Bermuda. As indicated above, the physi- cal and edaphic diversity of the region provided condi- The Pinus palustris ecosystem " the core of the tions for broad-scale speciation. Of the total vas- Coastal Plain cular plant taxa endemic to the entire Coastal Plain, are obligate associates of the Pinus palustris eco- As shown in Fig. Note that in all subregions we tally only and west to east Texas Ware et al. This large the taxa associated with the Pinus palustris ecosystem. It is of interest to further analyse the degree to which endemics are restricted to one or several of the subregions, Table 2. Distribution by Coastal Plain subregion of narrowly endemic taxa taxa endemic to one subregion. Coastal Plain subregion Number of endemics Fig. Mid-Atlantic Coastal Plain 44 taxa Dotted line: This confirms a pattern long ample reason for concern over the future of this ecosys- observed by students of the Coastal Plain flora: This is perhaps not surprising, considering their personnel to conduct prescribed burns. Proper application of fire can refugium of evolved endemics. If one considers taxa that are endemic to two ers and managers have become skilled at applying pre- subregions, the pattern established above remains Ta- scribed burns to small properties, in which whole blocks ble 3. The East Gulf Coastal Plain which shares a total burn evenly and completely. However, it is now believed of taxa with other subregions and Florida Penin- Frost that incomplete or patchy burns more closely sula 88 shared endemics are once again the ecoregions mimic historical conditions, when lightning-set wildfires with the largest number of endemics, with the South and fires set by American Indians swept across landscape- Atlantic Coastal Plain 78 shared endemics , Mid-At- sized parcels. Patches of unburned or incompletely burned lantic Coastal Plain 36 shared endemics , and West habitat allow survival of some species, including subcanopy Gulf Coastal Plain 23 shared endemics trailing. The hardwoods, which require longer fire intervals. Moreover, large number of South Atlantic Coastal Plain shared insect guilds, which are essential for plant pollination, as endemics is explained by its central position and its food items for many animals, and for ecosystem nutrient ability to combine with the Florida Peninsula, East Gulf recycling, may be adversely harmed by thorough burns. Coastal Plain, and Mid-Atlantic Coastal plain. Moreover, speciation within the egeries: National Forests owned by the U. De- that have adapted to xeric habitats MacRoberts et al. Together rainfall gradient from east to west. National Park Service in Texas. State conservation lands are also diverse in owner- and provision of recreational opportunities. Private con- ship and purpose, ranging from state parks to wildlife servation areas are also not immune from policy changes management areas to nature preserves. A sampling of that may have impacts of the effective conservation of those important to the Pinus palustris ecosystem in- the Pinus palustris ecosystem. Nature Conservancy working at fewer, larger areas, Private landowners generally do not have large enough which has potentially positive and negative effects rela- parcels to practice ecosystem-level management of P. Examples not intended to be complete of Plain. An analysis of the conservation status of the 44 critical, privately owned Pinus palustris ecosystem areas endemic plants associated with Pinus palustris indicates include the Green Swamp and Myrtle Head Savanna in that 28

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are well-protected, in the sense of having multi- North Carolina The Nature Conservancy ; the Disney ple occurrences on well-managed conservation lands Wilderness Preserve in Florida The Nature Conserv- military, national forest, state game land, state forest, ancy , the Joseph Jones Ecological Research Centre in private; but see above for caveats , while 16 are poorly Georgia; Tall Timbers Research Station in Florida; T. It is clear that even in a Coastal Plain and Tatum lands in Mississippi; and Sandylands Preserve subregion with very significant conservation areas, lo- in Texas The Nature Conservancy. Are public and private lands truly protected? The question of what constitutes protection is not The implications of narrow endemism straightforward. One major hurdle is pattern of substantial local endemism presents some that research needs to be conducted over extended peri- conservation challenges. Conservation planning requires ods â€” decades â€” in order to assess effectiveness of man- that conservation action be directed toward the conser- agement and viability of the community Platt In vation targets, and there has been a general inclination some cases, fire management has been in place for dec- to treat endemic species as high-priority conservation ades, but there is little or no funding available for habitat targets Groves Conservation planning also de- monitoring or for research into community dynamics. In the case of the Pinus palustris ecosys- term conservation status. While multiple-use conserva- tem, large size may be a particular important factor tion can be made generally compatible with the conser- because of the importance of active fire management, vation of the Pinus palustris ecosystem and its endemic and the correlation between size and ability to safely and biota, these areas are under periodic threat from politi- effectively conduct prescribed burning in a landscape cally driven changes in land-use policy that affect the with rapidly increasing human development. Military lands are under particular Future protection of the Pinus palustris ecosystem threat, as political changes and military challenges oc- will call for imaginative new solutions as well as relying cur around the world and as the armed services struggle on traditional ones. Outright purchase of additional land to reconcile conservation goals with increased training by public and private entities will continue. Ideally on fewer installations. Terminological and methodological as- long as the natural processes are protected no drainage pects of the mapping and analysis of global biodiversity. Effects of repeated burning in are likely to be viable over the long-term. The Nature a Florida pine savanna: The geography of imperilment: Partnerships may also be a ing conservation toward critical biodiversity areas.

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## 3: State of the Nation: The Condition of Biodiversity Across the United States

*State of the States: Geographic Patterns of Diversity, Rarity, and Endemism, Bruce A. Stein et al. 6. The Geography of Imperilment: Targeting Conservation towards Critical Biodiversity Areas, Stephen J. Chaplin et al.*

Biotic Uniqueness An Overview Endemism, or the confinement of species or other taxa to particular geographic areas, can be a slippery concept. So when do species or places become interesting on account of their "endemism"? Islands with unique floras and faunas provide the clearest answer. Long-distance colonization, the curtailment of gene flow with close relatives, adaptation to new biotic and abiotic conditions, and in some cases the survival of ancestral forms that have become extinct on mainlands can be seen and studied with exceptional clarity on islands that are rich in species found nowhere else. Similar evolutionary forces may be revealed to operate more subtly in regions and habitats with islandlike qualities. California is a good example of an islandlike area within a continent; it is a region of mediterranean climate completely surrounded by mountains, desert, and ocean hostile to much of its flora and fauna, and the nearest similar "islands" are far away, in Chile and the Mediterranean Basin. The endemic-rich Californian flora has been an influential living laboratory for the study of plant adaptation and speciation. Two of the founders of modern plant evolutionary biology were G. Ledyard Stebbins ; UC Berkeley and UC Davis , who first focused evolutionary theory on the study of plants with his *Variation and Evolution in Plants* and whose work called attention to the central roles of hybridization and polyploidy in plant speciation; and Jens Clausen ; Carnegie Institution , who is best known for leading interdisciplinary experimental studies of genetic differentiation of plant populations along gradients and who wrote *Stages in the Evolution of Plant Species* Since the mid-twentieth century, there has been a flourishing tradition of using endemic-rich Californian genera such as *Clarkia*, *Ceanothus*, *Limnanthes*, *Madia*, and *Mimulus* as model systems in evolutionary biology see Chapter 3. Problems in Defining Endemism Before discussing endemism, or geographic restriction, of species to either the state of California or the California Floristic Province CFP , let us consider some of the issues that affect its definition. Relationship to Rarity In common with many other works, this book uses the term endemism to mean the condition of having a limited geographic range, regardless of whether a species can be considered rare. However, in the literature on the biology of rarity, the term is sometimes used in a narrower sense. For example, in a classic review of endemism in higher plants, Kruckeberg and Rabinowitz define endemics as species existing as only one or a few populations. They note that such species can nearly always be considered rare in the sense of having very small geographic ranges. Many endemics as defined by these authors are also rare in the sense of having narrow niches; the best-known examples are plants specialized on particular soils, often called "edaphic endemics. Appropriate Spatial Units Islands are natural units for defining and measuring endemism, because the boundaries of an island are clearly defined and obviously linked to the evolutionary processes giving rise to unique species. This is less true for almost any other kind of geographic unit. In the United States, an important source of data is the Natural Heritage Network, a national program founded by the Nature Conservancy in the mids and now implemented by each state. Analyses of these data Stein et al. The problem with this state-based approach is that it greatly understates the diversity of biogeographic regions that occur across many states. Appalachia is an important U. Ecoregions are units defined by biogeographers on the basis of shared climates, vegetation types, and major assemblages of species. Various classifications are used by conservationists e. Forest Service, Environmental Protection Agency , and biological databases e. Analyzing endemism by ecoregions seems more defensible than by states, but it has its pitfalls too, and California is a good example. In a global conservation assessment Ricketts et al. Biogeographic units based on assemblages of related species are another alternative. In the most widely used system, the California Floristic Province forms part of the Madrean Region, which belongs in turn to the Holarctic Kingdom Table 1; Takhtajan The majority of authors define the California Floristic Province as including all nondesert parts of the state of California, plus south-central Oregon and northwestern Baja California Figure 4; see, e. Under a

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narrower definition, the wetter areas of northwestern California and southern Oregon may be considered part of the Rocky Mountain Province Takhtajan The California Floristic Province broadly coincides with the mediterranean climate or mediterranean biome, as defined by rainy winters, dry summers, annual precipitation of 25 to centimeters, and sclerophyllous vegetation Dallman Again, by some definitions, northwestern California and southern Oregon are too rainy, the Sierra Nevada too snowy, and parts of the Central Valley too arid to be considered mediterranean. Under the broad definition, which is consistent with a floristic analysis of the West Coast Peinado et al. Thus it is reasonable to speak of endemism in California as a natural phenomenon and not just the product of a political boundary. This book uses the broad definition of the California Floristic Province see Figure 4 , in accordance with major works on the flora Raven and Axelrod ; Baldwin et al. Data on endemism in the state of California were generally obtained from published sources plants, Baldwin et al. Data on endemism in the California Floristic Province were harder to obtain. Remarkably, for plants there is currently no database from which the thousands of species endemic to the Floristic Province can easily be counted or identified, but a preliminary attempt is made in this book see Appendix. For animals, the modest lists of Floristic Province endemics were obtained by visually interpreting range maps in atlases and by asking experts on each group. Spatial and Taxonomic Scales Systematic biases in the estimation of endemism arise from both spatial and taxonomic scales. Larger geographic units will tend to have more endemics than smaller ones. Among continents or other units sharing relatively few species,  $z$  may approach 1. Another solution is to calculate diversity and endemism from species range maps that have been converted to equal-area polygons  $e$ . With regard to taxonomic scale, some data sources report endemism based on all named taxa species, subspecies, and varieties ; others report only full species. Logically, endemism in a given geographic area will always be higher among taxa of lower rank Kruckeberg and Rabinowitz Taxa below the species level are described more often and on the basis of smaller differences in vertebrates than invertebrates, and in showier invertebrates butterflies than inconspicuous ones most others. Examples from California suggest this leads to considerable bias. In kangaroo rats, 23 subspecies but only 5 full species are endemic to the state Goldingay et al. In birds, 64 named taxa but only 2 full species are state endemics Shuford and Gardali In plants, however, endemism is 34 percent for all named taxa and 28 percent for full species Chapter 3, Table 3. Grasshoppers show endemism of 53 percent for full species plus subspecies and 51 percent for full species only Chapter 4. The much smaller disparities for plants and grasshoppers than for kangaroo rats and birds suggests that subspecies and varieties are less often described in plants and invertebrates than in vertebrates. In the majority of invertebrates, in fact, surveys are too incomplete for even crude estimates of species-level endemism Chapter 4. Full species are the focus of this book because of the extra subjectivity and bias introduced by subspecies. Defining species remains a perennial source of debate in both plant and animal systematics Mallet Traditionally, most taxonomists have sought consistent breakpoints in the variation of multiple traits, presumably reflecting a lack of gene flow, as a way to define the boundaries between related species  $e$ . As molecular data have become increasingly available, one alternative that has gained popularity is that any unique trait can define a lineage as a species Mallet In practice, these diagnostic traits are often variations in mitochondrial DNA, which evolves relatively fast in animals. Many existing species can be split up into multiple, small-ranged, and morphologically nearly identical new species under this concept Agapow et al. The California raven, for example, could be its own species based on molecular variation, even though it does not differ in appearance or behavior from other North American ravens Omland et al. Species numbers would more than double in plants and nearly double in most groups of animals under this "phylogenetic" or "diagnostic" species concept Agapow et al. This book accepts and includes all species that have been formally described by any method but does not deal with proposed new species of unclear status, nearly all of which are subdivisions of existing species. Relative versus Absolute Values Endemism may be reasonably expressed and compared either in percentages or numbers of species. It is worth remembering that percentages are more meaningful the greater the diversity as well as the higher the taxonomic rank of the group being examined. Throughout this book, endemism is expressed in both numbers

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and percentages, in the belief that they provide complementary information. Comparative information from other geographic regions is essential to characterizing and explaining Californian endemism. Acridid grasshoppers are one of the most endemic-rich groups in California, but they may be equally so in other parts of the mountainous western United States Knowles and Otte Whether or not it is remarkable that 5 of 23 kangaroo rats *Dipodomys* or 21 of 22 slender salamanders *Batrachoseps* are endemic to California depends on whether ecologically similar groups are just as diverse in neighboring regions. It is challenging to find, for almost any group, either comparative data or interpretive analyses that place endemism in California in a larger context. This book relies on comparisons with other states and the other four mediterranean climate regions to provide a context for Californian endemism. Large-Scale Patterns in Species Richness and Endemism One of the best predictors of species richness at a global scale is plant productivity, which is determined at large scales by the abundance of water and solar energy. At low latitudes water exerts stronger control, whereas at high latitudes solar energy is a stronger limitation. There are consistently more species of plants and animals in the warm and wet parts of the world than the colder or drier ones, regardless of whether the latitude is tropical or nontropical Figure 5a; Hawkins et al. Within the United States as a whole, plant and vertebrate animal diversity is higher in the warmer southerly states Stein et al. Within California, in contrast, the diversities of plants, birds, mammals, and amphibians although not reptiles are highest in the rainier north CDFG However, this is a case where the exception proves the rule, because California is a sunny but arid region in which water is the limiting factor governing plant productivity. Plant diversity in California is positively related to a remotely sensed index of productivity, which in turn is strongly related to rainfall but not to temperature Figure 5b; Harrison et al. Levels of endemism may follow geographic patterns different from total species diversity. Isolated islands, for example, are often high in endemism but low in total richness. Endemism on continents is harder to explain, but one recent analysis suggests that global patterns in endemism are best explained by climatic stability. This velocity represents how fast an organism has had to shift its distribution to keep pace with postglacial warming. It is slow, for example, in mild maritime climates that have undergone less change in temperature over time and in rugged regions where present-day temperatures vary sharply over short distances e. Globally, animal endemism is higher where climate change velocity is lower, and this effect is stronger for sedentary amphibians than for mobile mammals and birds, suggesting that stable climates have promoted the persistence of sedentary species with small geographic ranges Figure 6; Sandel et al. Endemism has been an important concept in conservation, as manifested by efforts to identify hotspots of high numbers of species found nowhere else. In the most famous such analysis, Myers et al. The 25 hotspots thus identified make up only 1. Nearly all hotspots are in the moist tropics or subtropics, contributing to their high overall diversity, and in the tropics they tend to be on islands or in islandlike mountain ranges, contributing to high endemism. Almost the only nontropical hotspots are found in the five mediterranean climate regions of the world, including the California Floristic Province. These five regions are also lower in vertebrate diversity than the other hotspots. Global analyses of animal endemism generally find similar results to those of Myers et al. For example, Rodrigues et al. The results highlighted many of the same tropical islands and mountain ranges identified by Myers et al. Likewise, Lamoreux et al. Nor did the mediterranean regions score as globally significant for total, endemic, or endangered birds Orme et al. A region is divided into equal-area polygons, within each of which the rarity-weighted richness is the sum of each species present in the polygon divided by the number of polygons occupied by that species. The output is a map showing high concentrations of narrowly distributed species Figures 7, 8. The input data are often coarse and incomplete; in these examples, only Heritage Network-listed species are included, and their distributions are less than fully known. Also, the results may sometimes be dominated by small numbers of imperiled species with very tiny ranges; there is no single "correct" way to balance the contributions of number of species and range sizes in this type of analysis.

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## 4: Precious heritage : the status of biodiversity in the United States - ECU Libraries Catalog

[et al.] -- *Safeguarding our precious heritage* / Mark L. Shaffer, Bruce A. Stein -- Appendix A. *Extinct and missing species of the United States* -- Appendix B. *State diversity, endemism, and rarity* -- Appendix C. *K&Auml;chler potential natural vegetation types* -- Appendix D. *Principal sources for U.S. species names in the Natural Heritage central.*

State of the Nation: Encompassing more than 3. This expanse includes an exceptional variety of terrains, from Death Valley at feet below sea level to Mt. McKinley at 20, feet above. The resulting range of climates has given rise to a wide array of ecosystems, from tundra and subarctic taiga to deserts, prairie, boreal forest, deciduous forests, temperate rain forests, and even tropical rain forests. Military installations are widely represented among these ecosystems. This tapestry sustains a remarkable array of species. Although the total number of species inhabiting our lands and waters is far from fully known, a recent tally puts the number of U. Additional species continue to come to light as new areas are explored, and new and increasingly powerful techniques for documenting diversity are developed. While many of these discoveries are among poorly known groups of organisms, such as insects and fungi, even among such relatively well known groups such as the flowering plants up to thirty new North American species are described every year. When Captain Meriwether Lewis of the First Infantry and Lieutenant William Clark set out in to cross the continent with their Corps of Discovery, they were under orders from President Jefferson to record everything they could about the countryside, including "the soils and face of the country, its growth and vegetation productions. Intrepid explorer and plant collector Major General John Charles Fremont top was one of many 19th-century Army officers who contributed to the early understanding of the natural history of the western United States. The beautiful California flannelbush *Fremontodendron californicum* is one of many plants named in his honor. The expeditions fueled the dramatic expansion in scientific knowledge about our flora and fauna that took place in the mids. A multitude of western plants and animals enshrine in their names the contributions of military men, such as Captain John C. Gunnison *Cynomys gunnisoni*, Gunnison prairie dog. As exploration of the American continent brought the nation into better focus, it became clear that the lands and waters harbored a spectacular assemblage of plants and animals. And while most people think of tropical rainforests as the region on Earth teeming with the greatest diversity of life, for certain groups of organisms the United States turns out to be a global leader. For example, more salamander species are found in the United States than any other country on Earth, with the greatest concentrations of diversity in the Southeast. A number of other freshwater groups exhibit similar patterns, including freshwater mussels and crayfishes. For gymnosperms, a plant group that includes conifers like pines and spruces, the United States is second only to China in its variety of species. This set of mid-oceanic volcanic islands has never been connected to the mainland, and all life forms naturally occurring in the archipelago either arrived from elsewhere or evolved in place from earlier arrivals. How is Our Biodiversity Faring? These early concerns led to such things as the passage of the Lacey Act 7 in and establishment of the National Wildlife Refuge System in By mid-century it was apparent that many species were in decline from a variety of causes. The first endangered species protection act was adopted by Congress in , and replaced by the more expansive Endangered Species Act of That is, which species are widespread, abundant, and secure, and which are rare or declining, and at increased risk of extinction? Fish and Wildlife Service, which with the National Oceanic and Atmospheric Administration has primary responsibility for administration of the ESA, is charged with assessing the condition of plants and animals for the purpose of determining which warrant protection under that Act. For this purpose, the service seeks to identify those species considered endangered, defined as "an animal or plant species in danger of extinction throughout all or a significant portion of its range," and those considered threatened, defined as "an animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. The number of listed species is dynamic, as additional species are considered for possible listing, and other species considered for delisting due either to recovery, extinction, or

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reassessment of condition. For example, thanks to the elimination of the pesticide ddt and other conservation practices, bald eagle numbers in the lower 48 states have climbed from a low in of nesting pairs to nearly 10, pairs at present. Based on this strong recovery, the species has now been removed "delisted" from the federal endangered species list. As described in more detail later, these federally listed species occur on both public and private lands, and are particularly well represented on military properties. A better overview of the broad condition of U. Based on about a dozen factors that relate to increases in risk of extinction, these assessments are designed to categorize species into one of five "conservation status ranks," ranging from critically imperiled G1 to secure G5 Table 1. As an example, the red-cockaded woodpecker is categorized as vulnerable G3 across its entire range, which stretches from Texas to Maryland. Its status in any particular state, however, may differ from that rangewide status. In North Carolina, for instance, the woodpecker is considered to be imperiled S2 , while in Virginia it is regarded as critically imperiled S1 , and in Maryland as possibly extirpated SH. Combining rangewide and state-level conservation status ranks offers a powerful tool for placing local conservation priorities into a broader context. By assessing the conservation status of each and every species in the best known groups of plants and animals, NatureServe and its state natural heritage program partners have been able to create a comprehensive view of the overall condition of the U. Summarizing status information across 23 plant and animal groups, representing 22, individual species, indicates that approximately one-third Looking at risk patterns across the various groups of plants and animals reveals some striking patterns Figure 1. While considerable conservation attention is focused on the plight of rare birds and mammals, these groups actually have relatively modest levels of imperilment when compared with several of the groups dependent on freshwater habitats. Flowering plants, however, contain by far the largest number of at-risk species, due both to the large number of species in this group overall more than 15, , and the many rare and highly localized plants that occur in different regions. More than one hundred U. As a result, another U. Although the diver species generally increases as one moves south towards the equator, the natural diversity of species in any given region is dependent on a host of factors. These include the complexity of terrain, type of soils, interconnections with other regions, and even the lingering effects of Pleistocene glaciers. State natural heritage programs maintain databases of precise locational data for most rare and endangered species, representing a valuable resource for military planners and resources managers. Because these state-managed data are developed and maintained according to nationally consistent standards, they can be pulled together to provide a far more fine-grained view of the geography of imperilment across America. Mapping the number of imperiled species G1 and G2 against an equal-area grid Figure 1. Through use of an innovative "rarity-weighted richness" analysis Figure 1. Much of the coastal sage scrub habitat that once covered millions of acres of southern California coast is now fragmented or lost. Marine Corps Base Camp Pendleton serves as a refuge for this rich ecosystem. These are the loss or degradation of natural habitats and the introduction and spread of non-native species. Poised to eclipse even these is the prospect of significant climate change, which has the potential to fundamentally disrupt natural ecosystems and their component species. The natural complexion of the American continent has changed dramatically in the time since European colonization. Although scholars now recognize that Native Americans extensively managed and manipulated their environment, the extent and condition of major habitats at the time of European settlement serves as a useful baseline for measuring change. The production of food, fuel, and fiber, and the construction of housing and other infrastructure has consumed vast areas of natural habitat. While much of this conversion is old news, the loss of natural habitat and other types of open space continue. Currently, about two million acres of open space are being lost to development a year, amounting to roughly six thousand acres each day NRCS Some natural ecosystems have been affected particularly dramatically. Taking advantage of the rich soils of the Midwest, agriculture has replaced more than 98 percent of the original tallgrass prairie, matching the level of loss to the longleaf pine forests of the Southeast. Wetlands play a particularly important role in providing fish and wildlife habitat and maintaining clean water, yet more than half 53 percent of wetlands across the lower 48 states have been destroyed Dahl Loss of habitat, and its implication for military

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operations, is perhaps most vividly illustrated along the rugged coast of southern California. Coastal sage scrub is an aromatic habitat that covered many of the seaside hills stretching south from Los Angeles to San Diego. As one housing development after another has been built in the hills overlooking the Pacific Ocean, much of this unique habitat has been lost one piece at a time. Over the years, the cumulative effect of these piecemeal land use decisions resulted in the loss of much of the original coastal sage scrub, with the result that a variety of species dependent on this habitat type have declined significantly. Among these is the California gnatcatcher *Polioptila californica*, a diminutive bird whose plight landed it on the federal list of endangered species. Home to the First Marine Expeditionary Force, Camp Pendleton is the only west coast amphibious assault training center. Stretching along 17 miles of coastline, the installation is something of an island of natural habitat in a sea of urbanization, and now harbors the largest contiguous stands of coastal sage scrub in the San Diego region.

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5: Precious Heritage - Bruce A. Stein; Lynn S. Kutner; Jonathan S. Adams - Oxford University Press

*The lowest-priced brand-new, unused, unopened, undamaged item in its original packaging (where packaging is applicable). Packaging should be the same as what is found in a retail store, unless the item is handmade or was packaged by the manufacturer in non-retail packaging, such as an unprinted box or plastic bag.*

Our Precious Heritage, Jonathan S. Stein, and Lynn S. Discovering Life in America: Stein and Frank W. Conservation Status of U. State of the States: The Geography of Imperilment: More than the Sum of the Parts: Leading Threats to U. Strategies for Biodiversity Protection, Michael J. Owing Up to Our Responsibilities: Who Owns Lands Important for Biodiversity? Shaffer and Bruce A. Extinct and missing species of the United States Appendix B: Kutner, and Jonathan S. Adams Reviews and Awards A Choice Outstanding Academic Title for "[This] is a skillfully written and visually appealing book that calls on the American people to fully appreciate the rich, but threatened, biodiversity of the United States. After many chapters dedicated to this thorough exposition, Precious Heritage culminates its American journey by offering concrete suggestions for safeguarding the natural heritage that is described and beautifully photographed throughout this valuable book. In its totality, Precious Heritage offers readers an invaluable education in U. The writing is interesting, the layout is attractive, the photographs are excellent although I wish that some had been larger , and the paper is of high quality. I highly recommend this book for general reading, for college courses, and for persuading legislators of the opportunities for protecting unique, wonderful, and vulnerable species and ecosystems in the United States. It is also extremely well edited. Although it has over 25 authors, the book reads with a common voice and consistent style. I can think of no other data-rich reference book that also provides anecdotes about Louis Agassiz, J. Audubon, the Bartrams, Lewis and Clark, and Phil Pister[I]t will make a welcome addition to the library of anyone interested in any aspect of conservation in the United States, including those who are responsible for managing natural areas. In a very accessible format -- clearly written text accompanied by numerous figures, maps, charts and tables -- Precious Heritage explains how the data has been collected and analyzed, indicates what it can tell us, and provides avenues for preservation.

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