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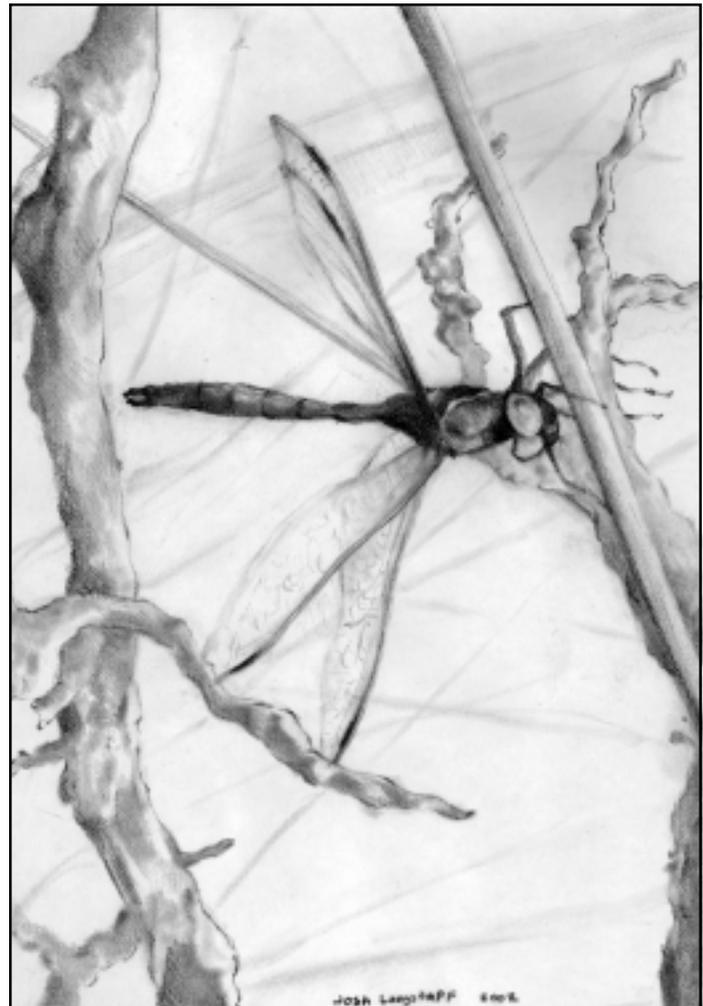
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*Cover: Hine's emerald dragonfly
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Letter from the Editor

Dear Readers:

2002 has been an exceptionally busy year here, as we are in the process of transforming the UPDATE in several significant ways. In September we bid a fond farewell to Jennifer Jacobus, our former Publication Editor. We miss her excellent editorial skills, and we wish her the best as she finishes her dissertation. Saul Alarcon-Adams, who has been involved with online development at the UPDATE, has succeeded Jennifer. Saul brings a wealth of experience, and has facilitated and contributed to the translation of article abstracts into French and Spanish, a feature that began with the September/October 2002 issue.

Our November/December 2002 issue introduces our new "Species at Risk" section where we will present the profile of rare and declining species, including their taxonomy, distribution, physical characteristics, natural history, conservation status, and economic importance. This section will be also offered in Spanish.

In addition, for the last year we have been working with Brian Rosenblum of the Scholarly Publishing Office at the University of Michigan to create electronic files of our entire archive. This enormous task will be complete within a few months and greatly improve the functionality of our website.

Finally, over the last few months we have been working with a scientific illustrator, Ryan Burkhalter, to redesign our cover and the inside format of the UPDATE. Our new look will debut in the January/February 2003 issue. We look forward to presenting the results of our efforts, and we welcome your feedback.

Best wishes,

Beth Hahn and Saul Alarcon-Adams



Former managing and publication editors M. Elsbeth McPhee (left), and Jennifer Jacobus (right).

The Status of Mammalian Carnivores in Turkey

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Abstract

Turkey, a natural land bridge connecting Europe and Asia, was historically home to a myriad of mammalian species, including a full complement of carnivores such as the Asiatic lion (Panthera leo persica), Caspian tiger (Panthera tigris virgata), gray wolf (Canis lupus), striped hyena (Hyaena hyaena), brown bear (Ursus arctos), Anatolian leopard (Panthera pardus tulliana), Eurasian lynx (Lynx lynx), caracal (Felis caracal), Eurasian otter (Lutra lutra), golden jackal (Canis aureus), red fox (Vulpes vulpes), European wildcat (Felis silvestris caucasica), pine marten (Martes martes), and other smaller mustelid species. Most of the largest carnivores have been extirpated while others are in decline. This article gives an account of the status of several carnivores still inhabiting Turkey. The fate of Turkey's wildlife lies with various governmental bodies holding often conflicting agendas and handicapped by a lack of skilled personnel and funding. If Turkey's current suite of laws can be strengthened, transparently enforced, and corruption rooted out, the long-term survival of carnivore species throughout the Middle East will be enhanced.

El Estatus de Mamíferos Carnívoros en Turquía

Resumen. Turquía, un puente natural que conecta a Europa y Asia, era históricamente el hogar de una miríada de especies mamíferas que incluía un grupo complejo de carnívoros tales como el león asiático (Panthera leo persica), el tigre del Mar Caspio (Panthera tigris virgata), el lobo (Canis lupus), la hiena rayada (Hyaena hyaena), el oso café (Ursus arctos), el leopardo de Anatolia (Panthera pardus tulliana), el linco euroasiático (Lynx lynx), el caracal (Felis caracal), la nutria euroasiática (Lutra lutra), el chacal dorado (Canis aureus), la zorra roja (Vulpes vulpes), el gato montés europeo (Felis silvestris caucasica), la comadreja alpina (Martes martes) y otras especies más pequeñas de mustélidos. La mayoría de los carnívoros de gran tamaño han sido extirpados, mientras que otras especies están en descenso. Este artículo da una reseña del estatus de varios carnívoros que aún habitan en Turquía. El destino de la vida silvestre en Turquía recae en diversas instituciones gubernamentales maniatadas por la falta de personal calificado y capital, las cuales frecuentemente mantienen programas de trabajo en conflicto. Si además de eliminar de raíz la corrupción las diferentes leyes actuales de Turquía pueden ser mejoradas y transparentemente ejecutadas, la sobrevivencia a largo plazo de las especies de carnívoros en el medio oriente podrá ser mejorada.

Le Statut d'Espèce Mammifère en Turquie

Résumé. La Turquie, un pont de terre qui relie l'Europe à l'Asie était historiquement l'endroit où on se trouve une vaste myriade des mammifères, y compris un effectif complet des carnivores comme le lion asiatique (Panthera leo persica), le tigre caspien (Panthera tigris virgata), le loup (Canis lupus), l'hyène rayé (Hyaena hyaena), l'ours brun (Ursus arctos), le léopard d'Anatolien (Panthera pardus tulliana), le lynx eurasien (Lynx lynx), le caracal (Felis caracal), la loutre eurasienne (Lutra lutra), le chacal doré (Canis aureus), le renard rouge (Vulpes vulpes), le chat sauvage européen (Felis silvestris caucasica), la belette alpine (Martes martes) et d'autres espèces plus petites de mustélides. La plupart des plus grands carnivores ont été éradiquée tandis que d'autres sont en déclin. Cet article donne un compte-rendu du statut de plusieurs carnivores qui

habitent encore en Turquie. Le sort de la faune de la Turquie se trouve avec de diverses organisations gouvernementales qui tiennent des ordres du jour souvent contradictoires et qui manquent de personnel habile et de financement. Si les lois courantes de la Turquie sont renforcées et mieux coordonnées, imposées d'une manière ouverte et si l'on élimine la corruption, alors la survie à long terme de l'espèce du carnivore du Moyen-Orient peut être possible.

Asia Minor or Anatolia (today's Turkey) is a natural bridge connecting Europe and Asia (Figure 1). This region was historically home to a diverse group of carnivores such as the Caspian tiger (*Panthera tigris virgata*), the Asiatic lion (*Panthera leo persica*) gray wolf (*Canis lupus*), striped hyena (*Hyaena hyaena*), brown bear (*Ursus arctos*), Anatolian leopard (*Panthera pardus tulliana*), Eurasian lynx (*Lynx lynx*), caracal (*Felis caracal*), Eurasian otter (*Lutra lutra*), golden jackal (*Canis aureus*), red fox (*Vulpes vulpes*), European wildcat (*Felis silvestris caucasica*), pine marten (*Martes martes*) and other smaller mustelid species (BPPC and EEII 2002). During the nineteenth and twentieth centuries, some of these species were completely extirpated from the region or became rare due to indiscriminate hunting and habitat destruction. Anatolia's last Asiatic lion was reportedly shot in the Birecek forestlands of eastern Turkey (Turkiye Avcilari 2002; Yesil Atlas 2002). One of the last pairs of Caspian tigers is recorded as having been killed in 1943 on the Selcuk Plain in southwestern Turkey (Duygu 2002). Although there are still unconfirmed sightings and signs of the subspecies in eastern Turkey, Turkmenistan and Afghanistan (Lairweb 2002), unsubstantiated reports indicate Anatolia's last tiger was killed near Uludere, in southeastern Turkey's Hakkari Province in 1970.

Several other smaller species, including the Anatolian leopard, striped hyena, caracal, Eurasian lynx and Eurasian otter have been nearly

extirpated or are rare across the region (BPPC and EEII 2002). Other species, such as the wolf, golden jackal, and brown bear are in decline, living in fragmented habitat pockets. In this article I examine the status of several species of carnivores inhabiting Turkey. I also discuss the organization of Turkish institutions involved in the conservation of species in the region, and how the complexity of the institutional structure in Turkey may affect the survival of these predators.

Gray wolf

The gray wolf (*Canis lupus*) of Turkey averages between 110-150 cm in length and can weigh over 50 kg (Can 2002). As of late 2002, wolves were not legally protected in Turkey. Under the 1937 Turkish Land Hunting Law, the wolf is listed as a pest and can be hunted throughout the year with no limitations (International Wolf 2002). The primary prey of the gray wolf is roe deer, hare, and the still abundant wild boar. Poison has been widely used to control the population, and the canids are killed primarily because of livestock depredation, and secondarily for pelts and rural peoples' fear of rabies (International Wolf 2002). There have been numerous undocumented reports of wolves attacking rural villagers, especially during hard winters. According to local accounts, wolves frequently come down from the Black Sea mountain ranges into warmer forested valleys, even entering villages vacated in the winter and lodging under the empty dwellings (Civelekoglu

2002).

In 2000-2001, Emre Can of "The Turkish Society for the Conservation of Nature" (DHKD) collected data on the distribution, prey base, conservation and management practices of wolves in Turkey. Can estimated a declining population of 5,000-7,000 wild wolves in Anatolia, living mainly in the central steppe and northern mountain ecoregions (Can 2002; International Wolf 2002). This report will be complemented by empirical data on the current numbers and distribution of the species gathered during 2002-2003 by up to 1,500 Turkish forestry offices throughout the nation (International Wolf 2002). If Can's estimate of over 7,000 of these canids in Turkey is correct, this wolf population may provide a significant migratory reservoir for restoring wolf populations across the Middle East and the Caucasus.

Brown bear

The brown bear is usually represented in Anatolia by two subspecies: *Ursus arctos syriacus*, the "yellow bear" of the Middle East, and the more common *U. a. lasistanicus* (Dinets 2002). *U. a. syriacus* is a very distinctive subspecies of brown bear: yellowish, with white claws, large ears and long shaggy fur (Dinets 2002). *U. a. lasistanicus* is usually larger than *U. a. syriacus* with black claws, a yellowish-red coat and a white spotted chest (Dinets 2002). Bears in Turkey typically weigh between 70-250 kg (Onderer 2002). According to a recent study by Russian biologist Anatoly Kudatin (Dinets 2002), these

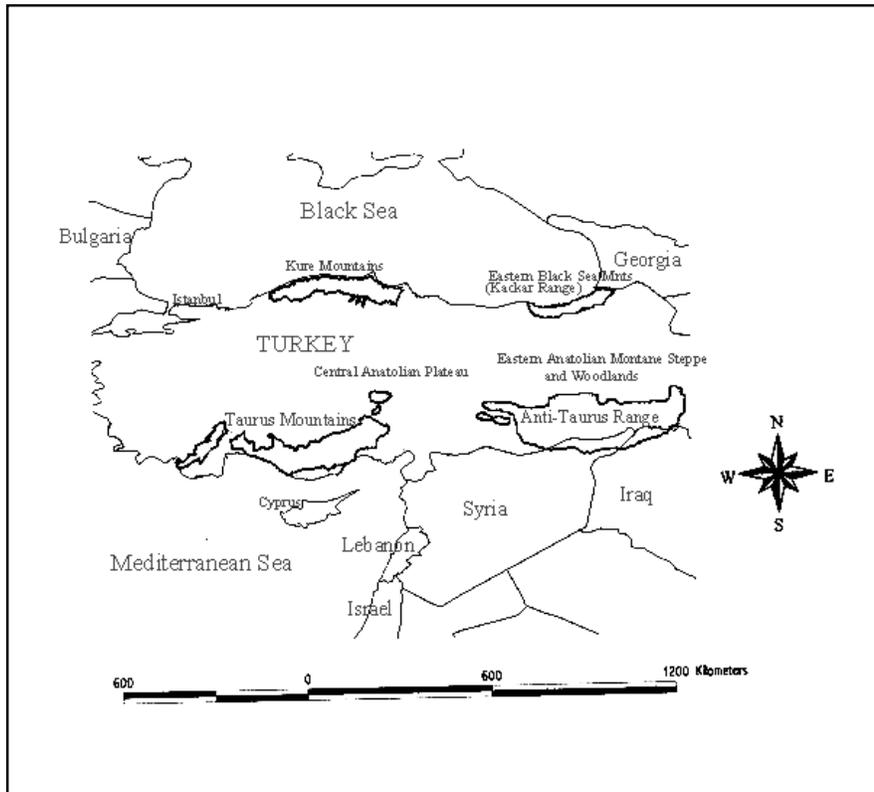


Figure 1. Turkey. Map by Kirk Johnson.

two subspecies commonly do not hibernate in the Turkish winter, a biological aspect also observed by a local Turk from the Black Sea (Civelekoglu 2002). Research suggests that *U.a. lasistanicus* and *U.a. syriacus* males may not have fixed territories unlike other brown bear subspecies, and spend the mating season in forest clearings and meadows (Dinets 2002).

These bear subspecies were once widespread throughout Turkey, but their numbers have declined to an estimated 800-3,000 animals, living mainly in core population areas near Artvin, Tunceli and Erzincan in the northeast, and Hakkari Province in the southeast (Can 2002; BPPC and EEII 2002). Brown bears still inhabit remote reaches of the Taurus Range, part of the Southern Anatolian Montane Forests ecoregion (Zeydanli 2002). *U.a. syriacus* has been mercilessly persecuted throughout its Middle Eastern range and is now confined to the most remote parts of east-

ern Turkey (possibly in the Taurus and Anti-Taurus Ranges), Iran, northern Iraq, and Armenia (Dinets 2002). A third bear subspecies, *U. a. caucasicus*, endemic to the High Caucasus Range of Georgia, may also roam into the Kackars (Onderer 2002).

In western Turkey, the brown bear has largely been extirpated, and exists only in isolated mountain habitat patches (Can 2002). Reportedly, poaching is a chronic problem in Turkey, with many bears shot illegally by farmers fearing for their crops and livestock or for sport hunting (Pandora 2002). Attacks on humans by bears in Anatolia are very rare. Bear hunting was officially banned in Turkey in the late 1970s, but due to complaints from farmers about livestock depredation, sport hunting by foreign hunters was reinstated in the Artvin and Yusufeli areas of the northeastern Black Sea Mountains in 1982 (BPPC and EEII 2002). Currently, however, the Central Hunting Com-

mission prohibits sport hunting (BPPC and EEII 2002).

Turkish bears have also suffered from the Gypsy street tradition of "dancing bears," where young cubs are captured after their mothers are typically killed and inhumanely trained to dance for profit on the streets of large cities. While this practice is illegal, foresters annually bring orphaned cubs and adult bears to the "Dancing Bear Rescue Center" southwest of the city of Bursa (van Dijk 2002). Up to 50 bears have been rehabilitated here in their 4.5-hectare enclosure, and plans call for the bears eventual release into the wild (van Dijk 2002).

Striped hyena

A mosaic of remote and largely intact steppe and woodland patches lies at the junction of three other biogeographic zones: the Lesser Caucasus Mountains (on the Turkish-Georgian border), the Iranian (central and eastern Anatolian plateau), and the Mediterranean (eastern Taurus and Anti-Taurus Ranges) (Gokhelashvili 2002).

These temperate semi-arid savannas and shrublands of eastern Turkey's Eastern Anatolian Montane Steppe are home to the striped hyena (*Hyaena hyaena*), a smaller cousin of the brown and spotted hyenas (*H. brunnea* and *Crocuta crocuta*, respectively) of sub-Saharan Africa (Gokhelashvili 2002; Postanowicz 2002). The 60-94 cm high striped hyena weighs between 25-55 kg and combines a diet of fruits, vegetables, insects, small animals, and meat from scavenged kills (Postanowicz 2002). This solitary nomadic omnivore is persecuted over much of its range because it destroys fruit and vegetable crops and is also killed for traditional folk medicine (Postanowicz 2002).

The Anatolian striped hyena is known to roam either singly or in pairs—however, in recent decades it

has suffered a steep decline in numbers and range, and no population estimate is available (Yuksekk 2002). The striped hyena has no legal protection and can be hunted at any time in Turkey (Yuksekk 2002).

Medium size carnivores

The northern Anatolian mountains, sometimes referred to as the Kure and Kackar Mountains, extend 1,100 km along the southern coast of the Black Sea. The Kackar Range provides sanctuary for other medium-sized carnivores, including the Eurasian lynx (*Lynx lynx*), Eurasian otter (*Lutra lutra*), golden jackal (*Canis aureus*), and the occasional caracal (*Felis caracal*).

The Eurasian lynx has an average body length of 80-130 cm, and weighs between 8-38 kg. The tan-colored adults have large heads and paws, with irregular brown spots, tufted ears and a short tail (BPPC and EEII 2002). Lynx are known to occasionally prey on domestic livestock (Colak 2002). Throughout Eurasia, the preferred prey of the lynx is roe deer, chamois and musk deer followed by hares and the young of red deer and wild boar (LCIE 2003). In Turkey, ungulates such as roe deer and young red deer are the predominate prey, along with hares (BPPC and EEII 2002).

The Eurasian lynx is still widely distributed in Turkey's mountains and coastal forests, from the Aegean to southeastern Anatolia, including the Black Sea, central Anatolia and the Mediterranean regions (BPPC and EEII 2002). It is, however, now rare all across its range. In 2000, a lynx was observed along a proposed oil pipeline route stretching from Ardahan's Posof Forest in the north-eastern Black Sea region, an unusual sighting in a region where the species is in decline (BPPC and EEII 2002). While the lynx is not protected under Turkish law, hunting is offi-

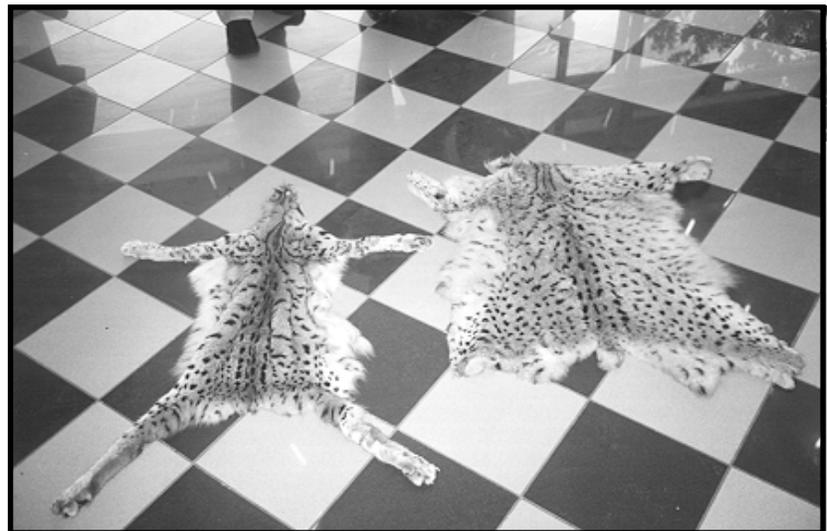
cially prohibited by the Turkish Ministry of Forestry, Central Hunting Commission (BPPC and EEII2002). Lynx pelts, however, are still sold in Turkish fur stores.

Another denizen of the northern mountains is the golden jackal (*Canis aureus*), the "coyote" of Turkey, an eight-to-eleven kilograms canid with a widespread range stretching from eastern Africa to southern Asia (Ivory 1997). Jackals normally live as mated pairs in family units with young, often including grown young helpers from earlier litters (Ivory 1997). They are opportunistic foragers with a varied diet, including berries, young ungulates, rodents, hares, ground-nesting birds, fish, insects and various small reptiles (Ivory 1997). No research has been conducted on the diet of golden jackals in the wilds of Turkey, but it likely includes the young of roe and red deer. On occasion, shepherds in the Kackars encounter jackals that take lambs from flocks (Colak 2002). These canids are still widespread in Asia Minor, but have no legal protection and are locally extirpated in many accessible locations.

A much rarer felid still calls

Anatolia's Black Sea and Taurus Ranges home. The caracal weighs between 11-20 kg and has distinctive ears characterized by long tufts of black hair (BPPC and EEII 2002). The caracals were once widespread throughout Anatolia, with records of the cat existing from the Aegean coastal mountains, the entire Taurus Range, eastern Anatolia and the Tokat area near the Black Sea (BPPC and EEII 2002). By 2002, the caracal was considered very rare and likely extirpated from most of these regions (BPPC and EEII 2002).

The caracal is known to attack domestic sheep and goats, but its usual prey includes birds, hares, and small rodents such as voles (BPPC and EEII 2002; CSG Species Accounts 1996). In the only study of this species conducted in the Middle East, twenty resident and transient caracals were found to utilize an irrigated agricultural area of 100 sq km in Israel's Negev Desert (CSG Species Accounts 1996). Such high local densities occurred despite the large size of the species home range, which averaged 57 sq km for females and 221 sq km for males (CSG Species Accounts 1996). The species has



Lynx pelts in a fur store. Photograph by Kirk Johnson.

official protection in Turkey under the Central Hunting Commission (BPPC and EEII 2002).

Three smaller carnivore species, the European wildcat (*Felis silvestris caucasica*), the red fox (*Vulpes vulpes*), and the pine marten (*Martes martes*), are still widespread throughout Anatolia, and their numbers may be stable (BPPC and EEII 2002; Curnata 2002; Garman 2000). *F.s. caucasica*, one of three subspecies of the European wildcat, exists only in Turkey and around the Caucasus Mountains of Georgia (Garman 2000). By far the greatest danger to the future of the three-to-eight kilograms European wildcat is hybridization with feral domestic cats (Garman 2000).

The five-to-ten kilograms red fox is Anatolia's most common predator and is found in nearly all ecoregions. In Turkey, the red fox is popularly divided into three physical types based on fur characteristics: soft-haired, rough-haired and the hairless or bald variety (Curnata 2002). Red fox are opportunistic feeders and typically eat small mammals, birds, insects and berries (British Broadcasting Corporation 2002). No reliable data exists

on population numbers or distribution in the wild since no studies have been carried out.

The European pine marten (*Martes martes*), a mustelid weighing up to 2.2 kg, has thick, dark brown fur with a pale throat patch. This species is still widespread in Turkey, with the largest populations existing in the Kure and Kackar Mountains, although data on population trends is unavailable (BPPC and EEII 2002). No research has been conducted on this species in Turkey.

Turkish institutions and conservation

In spite of millennia of abuse, Anatolia is still rich in fauna and flora compared to other Middle Eastern regions, with over 80,000 known species (DESD 2001). Turkey has various governmental and non-governmental institutions responsible for conserving its biological diversity, but there is no single national body coordinating conservation activities (DESD 2001). While the Ministry of the Environment creates policies and coordinates environmental protection, other national governmental bodies, including the Ministry of For-

estry, the Ministry of Agriculture and Rural Affairs, and the Authority of Specially Protected Areas implement the policies (DESD 2001).

The primary institution responsible for protecting wildlife and regulating hunting is the Ministry of Forestry. Under this ministry, the General Directorate of National Parks and Hunting issues hunting licenses. The numbers of licenses issued is controlled by the National Hunting Commission, the primary monitoring body for hunting, composed of stakeholders from hunter associations and local and national governmental bodies (DESD 2001).

The Ministry of Environment is another governmental institution created in 1991 to coordinate the national conservation/protection policies for the nation's wild fauna, flora, and habitats (DESD 2001). Under legislation enforced through the Ministry of Environment, most development projects in Turkey are required to conduct Environmental Impact Assessments (EIA) before project initiation, but staffing constraints make it difficult to enforce existing regulations (DESD 2001).

Conclusion

Shortage of technically trained staff is a major limiting factor in environmental programs, while funding for the planning and implementation of conservation activities is a low budget priority in related governmental institutions (DESD 2001). The lack of budget and trained staff involved in conservation planning and implementation in Turkey inevitably results in deficient or corrupt environmental law enforcement. Large carnivores in particular have been extirpated or are in drastic decline due to a lax implementation of existing laws and a lack of coordination between the responsible federal agencies. The lack of enforcement personnel and funding can lead to bribery and the poach-



Mentese mountains near the town of Kusadasi in Western Turkey. Photograph by Kirk Johnson.

ing of rare protected species (NTV and MSNBC 2001).

Turkey has sufficient legal protections on paper for most rare mammalian carnivores and other fauna. However, additional operational funds for fieldwork implementation should be allocated, with existing laws enforced and corruption rooted out. Bureaucratic obstacles need to be removed that stifle effective coordination between the federal conservation agencies and also with their provincial counterparts. If these steps are indeed implemented, in conjunction with a change in public attitude towards predators, the long-term survival of Anatolia's remaining ancient carnivore community may be possible.

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Book Review

Introduction to Conservation Genetics

by R. Frankham, J. D. Ballou, D. A. Briscoe. 2002.
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Abstract

Introduction to Conservation Genetics written by R. Frankham, J.D. Ballou, and D.A. Briscoe, is a comprehensive introductory text that provides an enlightening synthesis of data and theory from ecology, population genetics, evolution, and conservation biology. The book focuses on the science of conservation genetics and is appealing in its general lack of overt advocacy, while the final section provides meaningful applications to practical problems in conservation. Important concepts outlined in the text are emphasized by case-studies taken from primary literature, and chapters are concluded with a summary followed by exercises or problems. Beginning and seasoned researchers alike will benefit from a reference copy on their shelves.

Introducción a la Genética de la Conservación

Resumen. Introduction to Conservation Genetics (Introducción a la Genética de la Conservación) escrito por R. Frankham, J.D. Ballou y D. A. Briscoe es un exhaustivo texto introductorio que provee una síntesis esclarecedora de datos y teoría sobre temas de ecología, genética de poblaciones, evolución y biología de la conservación. El libro se enfoca en la ciencia de la genética de la conservación y es atractivo debido a que carece de una evidente apología, mientras que la sección final provee de aplicaciones importantes para problemas prácticos relacionados a la conservación. Conceptos importantes esbozados en el texto son enfatizados usando situaciones reales tomadas de la literatura considerada primordial sobre el tema, y los capítulos son concluidos con un resumen, seguido de ejercicios o problemas. Tanto principiantes como investigadores experimentados se beneficiarán de tener una copia como libro de referencia en sus estantes.

L'introduction à la Génétique de Conservation

Résumé. Introduction to Conservation Genetics (L'introduction à la génétique de conservation) écrite par R. Frankham, J.D. Ballou, et D.A. Briscoe est un texte d'introduction complet qui fournit une synthèse instructive des données et de la théorie de l'écologie, de la génétique de population, de l'évolution, et de la biologie de conservation. Le livre se concentre sur la science de la conservation génétique et il est attirant dans son manque général de recommandation manifeste, alors que la section finale fournit des applications significatives aux problèmes pratiques dans la conservation. Des études de cas tirées de la littérature primaire soulignent les concepts importants décrits dans le texte, et chaque chapitre se termine par un résumé suivi d'exercices ou de problèmes. Chercheurs chevronnés aussi bien qu'inexpérimentés tireront avantage d'une copie de référence sur leurs étagères.

The scientific fields of conservation and genetics have enjoyed decades of productive and innovative research and subsequently have provided many influential insights to the scientific community. In recent years, science and society alike have both benefited from the nexus of these two lines of research, and Conservation Genetics has left the nascent status of a "cross-disciplinary" field to blossom into its own discipline, rich with both theory and data. That being the case, it is surprising that only in this year has a comprehensive introductory text been published on the subject: *Introduction to Conservation Genetics* (henceforth referred to as "*ICN*") written by R. Frankham, J.D. Ballou, and D.A. Briscoe, and published by Cambridge University Press in 2002.

This book, written expressly for advanced undergraduate and graduate students, follows an accessible and logical format despite dealing with a field that draws on data and theory from several seemingly disparate sub-disciplines such as ecology, population genetics, evolution, and conservation biology. After two introductory chapters reviewing the scope and aim of conservation genetics writ large, the authors divide the remaining 18 chapters into three main sections: Evolutionary Genetics of Natural Populations; Effects of Population Size Reduction; and From Theory to Practice. In typical textbook format, most of the important concepts outlined in the text itself are further emphasized with boxed "real world" case-studies taken directly from primary research. Chapters are concluded with helpful summaries of main points and followed by a series of exercises or problems. Problem sets (and some examples woven into the text) may in some cases provide readers with meaningful hypothetical applications for different formulae, and in other cases direct attention to

some theoretical or even ethical concerns covered in the chapter. The organization of the text may be useful in generating classroom assignments or discussion topics, but advanced students (or researchers) may consider some sections unnecessary review, having covered similar material in prerequisite genetics and ecology courses. Apart from that caveat, this text has a reasonable blend of introduction and detail which should appeal to intellects at various levels.

Although the first two chapters and the final section of the book have a significant emphasis on the importance of conservation issues impinging upon global biodiversity, the book is appealing in its general lack of overt statements of advocacy and the absence of proselytizing to the reader. The authors instead focus much of the text specifically on the *science* of conservation genetics, rather than the mission of conservation biology. In fact, more than the first third of the book is spent detailing the direct applicability of evolutionary theory and population genetics to issues related to the conservation of biodiversity. Some readers may find these lengthy descriptions remedial, but most conservationists undoubtedly will find this a refreshing exposé of topics in evolution and population genetics that are too often left as a "black-box" when trying to confront conservation issues. The coverage of this material is easy to read and peppered with examples from the conservation literature, making these concepts more accessible to a wider audience. Given the now well-recognized importance of genetic data in conservation studies (e.g., recommendations by the World Conservation Union), the first section of *ICN* may well provide even experienced conservation biologists a needed springboard for gaining a foothold in this area of research.

The final section of *ICN* provides

a meaningful application of many concepts covered in the initial two sections to practical problems confronting conservation biologists today. There are chapters discussing genetic management of captive and wild populations, genetic management for potential reintroduction programs, the use of molecular genetics in forensics and the use of genetic data in population viability analyses. Like earlier sections, the case-study examples cited in this section are helpful, germane and recent.

ICN does use several botanical examples throughout the text and makes a fair discussion of the complications floral polyploidy and hybridization bring to species concepts in plants, as well as the associated conservation implications of which students and researchers should be aware. However, conservation biologists keenly attuned to the loss of botanical biodiversity may find the text significantly biased toward zoological examples. This is perhaps not a shortcoming of *ICN*, nor likely due to a lack of concern on the parts of its authors, as much as it is a reflection of the general bias toward studies of charismatic megafauna in conservation biology.

Although deep in its scope, researchers considering *ICN* should not hope for a manual on techniques or procedures used in conservation genetics. There are general and helpful discussions of the applicability of different molecular genetic markers to various conservation questions, but there is little in the way of specific descriptions of protocols or experimental design. Also conspicuously missing is any meaningful discussion of the roles different computer programs play in analyzing molecular genetic data. These were likely conscious oversights by the authors, as they instead provide adequate references to recent and relevant literature on these subjects. In fact, the omis-

sion of detailed discussions on the particulars of conducting conservation genetic research may well be a strength rather than a shortcoming of this text, as *ICN* will perhaps have longer staying-power before significant portions become outdated and in need of revision.

Perhaps the largest challenge for an introductory text on conservation genetics is to present original material that is more than a simple compilation of relevant theory from the fields of ecology, conservation, population genetics and evolution. In many regards, *ICN* overcomes this potential pitfall without much contrivance, and those sections which draw heavily from these related fields

are enlightening syntheses rather than review or reiteration. Previously published texts on the shelves of conservation geneticists are likely to be edited volumes of chapters contributed by active researchers (e.g., Avise and Hambrick 1996; Smith and Wayne 1996; Carvalho 1998). Although useful for peers who are already well-versed in the theory and vocabulary of conservation genetics, these edited texts are often too dense or esoteric for beginning students or colleagues in other disciplines who wish to gain a more detailed understanding of this emerging field. *ICN* fills this gap in the conservation genetic literature, providing necessary introductory material for the uninitiated, consid-

erable coverage of case studies which exemplify various concepts covered in the text, and a broad integration of theory from the fields of evolution, population genetics, ecology and wildlife management – the greenhorn and the seasoned researcher alike will benefit from a reference copy on their shelves.

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Species at Risk

The Hine's emerald dragonfly

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Abstract

The Hine's emerald dragonfly (Somatochlora hineana) may be the United States' most endangered species of dragonfly. S. hineana currently inhabits Wisconsin, Michigan, Illinois, and Missouri. It is a very site-specific species, living in calcareous wetlands with slow-flowing water where larvae can spend up to four years growing and developing. Human alterations of the species' limited habitat, such as filling in and fragmenting wetlands with development of roads and ditches, have contributed to the dragonfly's status. The species is federally listed as endangered, and a recovery plan was completed and approved by the U.S. Fish and Wildlife Service in September 2001. Conservation efforts include the management of extant populations, research, searches for additional populations, an education program, a reintroduction program, and tracking of the recovery progress.

La Libélula Esmeralda de Hine

Resumen. La libélula esmeralda de Hine (Somatochlora hineana) es quizás la especie de odonatos en mayor riesgo en los Estados Unidos. S. hineana actualmente habita los estados de Wisconsin, Michigan, Illinois y Missouri. Es una especie con requerimientos de habitat muy específicos, que vive en ciénagas calcáreas, con un flujo de agua lento, donde las ninfas pueden pasar hasta cuatro años creciendo y desarrollándose. Los disturbios del habitat causados por el hombre tales como el relleno y la fragmentación de las ciénagas por medio de la construcción de caminos y diques, ha contribuido al estatus de este odonato. La especie está listada a nivel federal como especie en peligro de extinción y un programa de recuperación fue completado y aprobado por el U.S. Fish and Wildlife Service (Servicio de pesca y vida silvestre de los Estados Unidos) en Septiembre del 2001. Los esfuerzos de conservación incluyen el manejo de poblaciones existentes, estudios de investigación, búsqueda de poblaciones adicionales, un programa de educación, un programa de reintroducción y el seguimiento del progreso de recuperación.

La Libellule Emeraude d'Hine

Résumé. La libellule émeraude d'Hine (Somatochlora hineana) est probablement l'espèce de libellule la plus en voie de disparition des Etats-Unis. S. hineana habite actuellement dans le Wisconsin, le Michigan, l'Illinois, et le Missouri. C'est une espèce dont l'emplacement est très spécifique, vivant dans les terres humides calcaires avec de l'eau qui coule lentement, où les larves peuvent passer jusqu'à quatre ans à grandir et à se développer. Les changements faits par l'homme à l'habitat limité des espèces, tels que boucher et fragmenter les terres humides avec le développement des routes et des fossés, ont contribué au statut d'espèce menacé de la libellule. S. hineana figure sur la liste des espèces en voie de disparition du gouvernement fédéral, et le 'U.S. Fish and Wildlife Service' a préparé et approuvé un plan de rétablissement en septembre 2001. Les efforts de conservation incluent la gestion des populations existantes, des études de recherches, des recherches pour retrouver des populations supplémentaires, un programme d'éducation, un programme de réintroduction, et des moyens de suivre le progrès de rétablissement.

Taxonomy

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Odonata
Family: Corduliidae
Genus: *Somatochlora*
Species: *S. hineana* Williamson

Geographic Range

The current distribution of the Hine's emerald dragonfly (*Somatochlora hineana*) spans four states: Wisconsin, Michigan, Illinois, and Missouri. *S. hineana* is present on twenty sites in three counties of Wisconsin, ten sites in three Michigan counties, nine sites in three Illinois counties, and three sites in two Missouri counties (Figure 1) (USFWS 2001). The populations in Michigan and Missouri are recent discoveries in the last five years.

In the past, specimens have been collected in Ohio, Indiana, and Alabama. However, all historic populations in these states are believed to be extirpated. There have been no confirmed observations from either Ohio or Indiana for over 40 years and only one specimen, collected in 1978, has been found in Alabama.

Physical Characteristics

The Hine's emerald dragonfly is a member of the Corduliidae family, also known as the emerald dragonflies because of their dazzling green eyes. The genera *Somatochlora* is represented by 26 species in North America, and are distinguishable by their tail and adjoining genitalia (USFWS 2001).

The Hine's emerald dragonfly, sometimes called the Ohio emerald or hook-tipped emerald, is one of the largest members of the genus *Somatochlora*, ranging from 5.8 to 6.4 cm (2.3-2.5 inches) in body length. In its adult stage, *S. hineana* can be identified from similar species by its dark metallic green thorax lined

with two lateral yellow stripes (Cuthrell 1999). The genitalia of the male is characterized by a downward forking abdominal tip, which most closely resembles that of *S. tenebrosa*. The female's ovipositor is straight and more difficult to distinguish from other similar species

Natural History

The life cycle of the Hine's emerald dragonfly has two immature aquatic stages (egg and larvae) before becoming a free-flying adult. After mating, the female deposits eggs, numbering in the hundreds, at the surface of the water. The female hovers over the water, dipping down repeatedly to break the water surface with her ovipositor. After hatching, the larvae may spend up to four years

growing and developing. Adults emerge between May and August. As adults, the dragonflies go through three phases: pre-reproductive, reproductive, and post-reproductive. The pre-reproductive phase is characterized by dispersal and foraging. In the reproductive phase, the adults establish a territory and begin mating. During this second phase males will carry out territory patrols, defending the area from intra- and interspecific competition. In the post-reproductive phase, the adults resume foraging and generally do not patrol territories.

S. hineana live in grass and shrub-dominated wetlands and fens, though the habitat varies depending on geographic location. Slow-moving water through grassy vegetation is an ideal habitat for the species' lar-

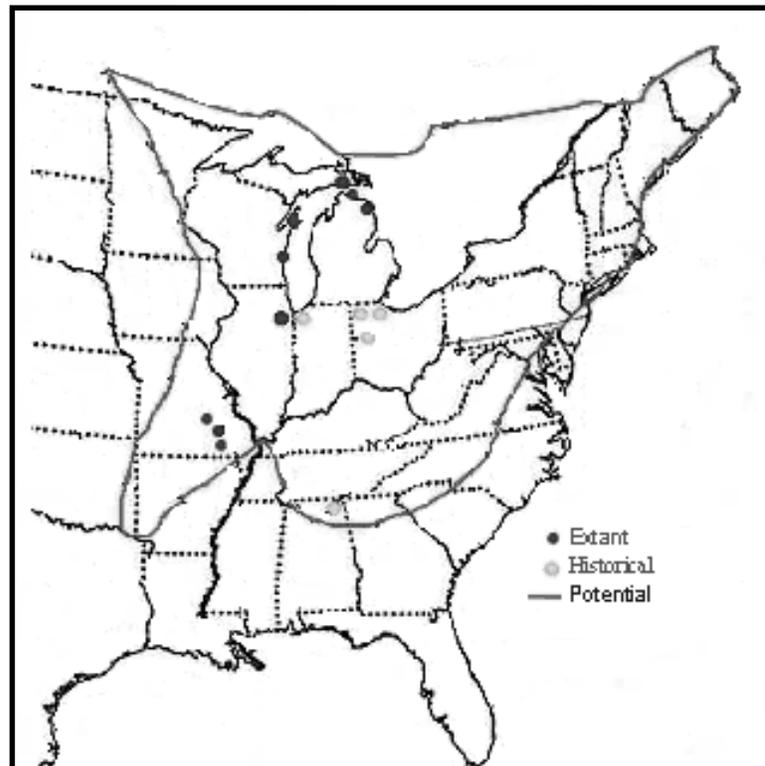


Figure 1. Hine's emerald dragonfly localities and potential range. Extant dots may represent more than one site. Potential range is based on locality, distribution of closely related *Somatochlora* spp. and Bailey et al. 1994. Map courtesy of Dr. Everett D. Cashatt, Curator of Zoology, Illinois State Museum.

vae, providing prey (e.g., insects, worms, and snails) as well as predator protection. The inhabited wetlands usually consist of a calcareous or dolomitic substrate and have slow water seeps. They are commonly adjacent to forest stands, which provides shade and cover. Adults feed on flying insects, such as mosquitoes and gnats, preferring to hunt along the forest's edge and by patches of vegetation.

Conservation Status

The primary cause of *S. hineana*'s decline is the destruction and degradation of its wetland habitat. The specialized wetlands needed by the species have a naturally limited distribution, and human disturbance has reduced them further. Development, such as the construction of ditches and roads, has led to devastating wetland loss and irreversible changes in hydrology.

More than three years after being first proposed, *S. hineana* was listed as a federally endangered species under the Endangered Species Act on January 26, 1996. In addition, it is now considered state endangered in Wisconsin, Michigan, Missouri, Ohio, and Illinois. The International Union for the Conservation of Nature (IUCN) deems the Hine's as endangered throughout its range, and The Nature Conservancy lists it as globally imperiled (USFWS 2001).

Conservation action

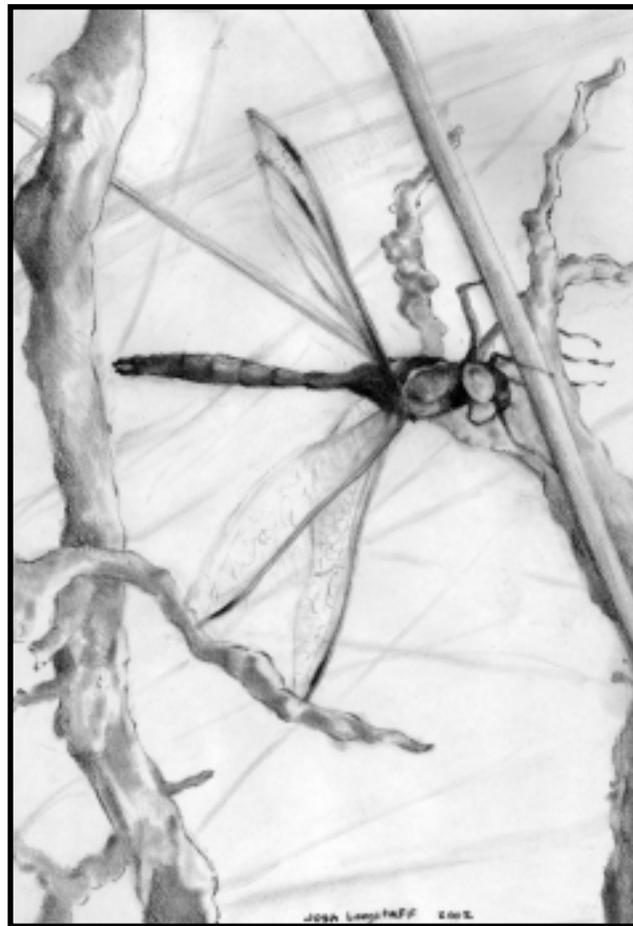
A recovery plan for *S. hineana* was completed and approved in September 2001. This plan outlines the following actions for the species' recovery team: 1) protect and manage extant populations; 2) conduct research studies; 3) carry out searches for additional Hine's emerald populations; 4) run an information and education program; 5) manage a reintroduction and augmentation program; and 6)

review and track recovery progress. The recovery team plans to reach a long-term goal of a minimum of 500 mature individuals for ten consecutive years in each subpopulation, and to have two breeding grounds within each subpopulation. Currently the government and cooperating organizations are focusing on protecting known Hine's habitat and surveying for additional populations. The program, however, faces biological and logistical challenges. Habitats are threatened by invasive exotic plants and off-road vehicle damage, and although government lands are easily accessed and monitored, potential habitat on private property would require the owners' cooperation and in

some cases the need of legal action.

As part of the surveying plan, the U.S. Fish and Wildlife Service (USFWS) recently identified potential sites for the Hine's emerald dragonfly in Michigan's Upper Peninsula, focusing on those areas similar to inhabited sites in Door County, Wisconsin. The prospective sites were identified using aerial photos and topographic and soil maps in accordance with the Michigan Natural Features Inventory and the U.S. Forest Service (Sjogren 2002). This work resulted in the discovery of seven new Hine's sites in Mackinac County, MI, six of them found within the Hiawatha National Forest (HNF).

Sjogren (2002) described six spe-



Hine's emerald dragonfly (*Somatochlora hineana*). Illustration by Joshua Langstaff. Original photograph taken by Kristina Kasik.

cific management objectives in the HNF: 1) work with the Hine's recovery team to help meet the goals and objectives outlined in the Recovery Plan; 2) protect wetland habitats known to contain the species, as well as potential habitat; 3) insure the maintenance of hydrologic function and integrity of habitat sites, including the provision of groundwater flow supporting the fen systems; 4) eliminate illegal off-road traffic in suitable habitat; 5) survey and identify new habitats; and 6) monitor known habitats to learn more about the overall population status as well as subpopulation dynamics.

As part of an overall effort to further understand the population status of several rare dragonfly species within the forest, the HNF biologists are "working to map and survey suit-

able habitats to better understand the distribution of Hine's" (Sjogren 2002). Mackinac County contains several rare and endangered insects as part of its diverse invertebrate community, and the effort put forth to protect the Hine's emerald dragonfly stresses the need for more comprehensive research on the habitat-species relationship in the area.

Economic Importance

The economic importance of the Hine's emerald dragonfly lies in the expanding hobby of wildlife viewing. Dragonfly watching has grown much in the past few years, and a recent dragonfly field guide publication by Dunkle (2000) evidences the popularity of this activity. Due to its rarity and beauty, entomologists and wildlife enthusiasts would consider

catching a glimpse of a Hine's specimen a special occasion.

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Taxonomía

Reino: Animalia

Phylum: Arthropoda

Clase: Insecta

Orden: Odonata

Familia: Corduliidae

Género: *Somatochlora*

Especie: *S. hineana* Williamson

Rango Geográfico

La distribución de la libélula esmeralda de Hine (*Somatochlora hineana*) abarca cuatro estados: Wisconsin, Michigan, Illinois y Missouri. *S. hineana* se encuentra presente en veinte sitios en tres condados de Wisconsin, diez sitios en tres condados de Michigan, nueve sitios en tres condados de Illinois y tres sitios en dos condados de Missouri (Figura 1) (USFWS 2001). Las poblaciones en Michigan y Missouri son descubrimientos recientes de los últimos cinco años.

En el pasado, algunos especímenes han sido colectados en Ohio, Indiana y Alabama; sin embargo, todas las poblaciones históricas en estos estados han sido extirpadas. No ha habido observaciones confirmadas en Ohio e Indiana por más de 40 años y sólo un espécimen, colectado en 1978, ha sido encontrado en Alabama.

Características físicas

La libélula esmeralda de Hine es miembro de la familia Corduliidae, también conocida como la familia de las libélulas esmeraldas, debido a sus deslumbrantes ojos verdes. El género *Somatochlora* está representado por 26 especies en Norteamérica y se distingue por la punta del abdomen y la genitalia contiguas (USFWS 2002).

La libélula esmeralda de Hine es también llamada libélula de Ohio o de la punta ganchuda. Es uno de los miembros más grandes del género *Somatochlora*, con una longitud del cuerpo que va de los 58 a los 64 cm (2.3-2.5 pulgadas). En su estado

adulto, *S. hineana* se puede diferenciar de otras especies similares por su tórax verde oscuro metálico, el cual tiene dos rayas amarillas laterales (Cuthrell 1999). La genitalia del macho se caracteriza por una punta abdominal bifurcada curvada hacia abajo, muy parecida al de la especie *S. tenebrosa*. El ovipositor de la hembra es recto y más difícil de distinguir de otras especies similares.

Historia natural

La libélula pasa por dos estados inmaduros acuáticos (huevo y ninfa) antes de convertirse en adulto. Después de aparearse, la hembra deposita centenares de huevecillos en la superficie del agua. La hembra revolotea sobre el agua, sumergiendo su ovipositor repetidas veces para

romper la tensión superficial del agua. Después de eclosionar, la larva puede pasar hasta cuatro años creciendo y desarrollándose. Los adultos emergen entre mayo y agosto. Como adultos, las libélulas pasan por tres fases: prereproductiva, reproductiva y postreproductiva. La fase prereproductiva se caracteriza por la dispersión y el forrajeo. En la fase reproductiva, los adultos establecen un territorio y comienzan a aparearse. Durante esa segunda fase los machos llevan a cabo vigilancia del territorio, defendiéndolo de la competencia intra e interespecífica. En la fase postreproductiva, los adultos reinician el forrajeo y generalmente no patrullan sus territorios.

S. hineana vive en ciénagas y pantanos donde existe una predominancia de arbustos y pasto,



Figura 1. Lugares con presencia de la libélula esmeralda de Hine y rango potencial. Los puntos que señalan poblaciones existentes (extant) pueden representar más de un sitio. El rango potencial está basado en sitio, distribución de especies relacionadas a *Somatochlora* spp. y Bailey et al. 1994. Mapa cortesía del Dr. Everett D. Cashatt, Curador de Zoología, Illinois State Museum.

aunque el habitat varía dependiendo de la localización geográfica. Agua con un flujo lento a través de vegetación con una mezcla de pastos es un habitat ideal para la ninfas, pues provee presas (por ejemplo: insectos, gusanos y caracoles), así como protección en contra de depredadores. Las ciénagas en las que esta especie habita usualmente son de baja profundidad, tienen una buena filtración y contienen un sustrato dolomítico o calcáreo. Estas ciénagas se encuentran comúnmente adyacentes a bosques, los cuales proveen de sombra y cubierta. Los adultos se alimentan de insectos alados como mosquitos y jejenes, prefiriendo cazar a lo largo del margen del bosque y en parches de vegetación.

Estatus de conservación

La causa primaria del declive de *S. hineana* es la destrucción y degradación de su habitat natural. Las ciénagas que la especie necesita son limitadas en forma natural y el disturbio ecológico causado por el hombre las ha reducido aún más. La construcción de diques y caminos ha llevado a una devastante pérdida de ciénagas y a cambios irreversibles en su hidrología.

El 26 de enero de 1996, más de tres años después de haber sido propuesta, *S. hineana* fue registrada como una especie en peligro de extinción a nivel federal en la "Endangered Species Act" (Acta de Especies en Peligro de Extinción) de 1973. Además, la especie es considerada en peligro de extinción a nivel estatal en Wisconsin, Michigan, Missouri, Ohio e Illinois. La "International Union for the Conservation of Nature" (Union Internacional para la Conservación de la Naturaleza, IUCN) considera a la libélula en peligro de extinción en todo su rango geográfico y "The Nature Conservancy" (Conservación de

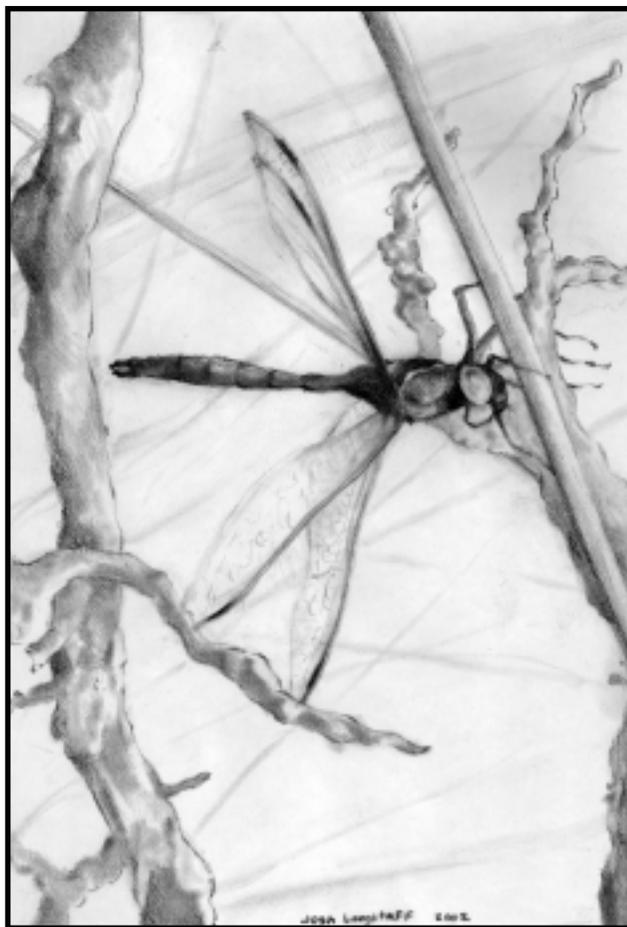
la Naturaleza) la enlista como amenazada globalmente (USFWS 2001).

Acción para la conservación

En septiembre del 2001 se completó y aprobó un plan de recuperación para *S. hineana*. Este plan establece las siguientes acciones para llevar a cabo por el equipo integrado para la recuperación de la especie: 1) proteger y manejar poblaciones existentes, 2) conducir investigación, 3) llevar a cabo búsquedas de poblaciones adicionales de la libélula esmeralda, 4) realizar un programa de información y educación, 5) manejar un programa de reintroducción e incremento de poblaciones, y 6) revisar

y dar seguimiento al progreso de la recuperación.

El equipo de trabajo planea alcanzar una meta a largo plazo de al menos 500 individuos maduros por diez años consecutivos en cada subpoblación y tener dos sitios de crianza dentro de cada subpoblación. Actualmente el gobierno y las organizaciones participantes se están enfocando en proteger y examinar los habitats conocidos de la libélula de Hine para localizar poblaciones adicionales. Sin embargo, el programa enfrenta retos de índole biológica y de logística. Los habitats están siendo amenazados por especies de plantas exóticas y por daño hecho por vehículos conducidos fuera de



La libélula esmeralda de Hine (*Somatochlora hineana*). Ilustración de Joshua Langstaff. Fotografía original tomada por Kristina Kasik.

caminos, y aunque la tierra que es propiedad del gobierno puede ser accesada e inspeccionada con facilidad, la inspección de los habitats potenciales que se encuentran en propiedad privada requerirá de la cooperación de los dueños y en algunos casos la acción legal será necesaria.

Como parte del programa de reconocimiento, el "U.S. Fish and Wildlife Service" (Servicio de Pesca y Vida Silvestre de Estados Unidos, USFWS) ha identificado recientemente sitios potenciales para la libélula en la Península Norte de Michigan, enfocándose en aquellas áreas con características similares a los sitios habitados por la especie en el condado Door en Wisconsin. Los posibles sitios fueron identificados usando fotografías aéreas y mapas topográficos y de suelos, de acuerdo al "Michigan Natural Features Inventory" (Inventario de Rasgos Naturales de Michigan) y al "U.S. Forest Service" (Servicio Forestal de Estados Unidos) (Sjogren 2002). Este trabajo resultó en el descubrimiento de siete nuevos sitios de la libélula de Hine en el condado de Mackinac, Michigan; seis de estos sitios fueron encontrados dentro del "Hiawatha National Forest" (Bosque Nacional Hiawatha, HNF).

Sjogren (2001) describe seis objetivos específicos en HNF: 1)

trabajar con el equipo de recuperación de la libélula para ayudar a lograr las metas y objetivos delineados en el Plan de Recuperación, 2) proteger ciénagas donde se sabe existe la especie, así como habitats potenciales, 3) asegurar el mantenimiento de la integridad y función hidrológica de los sitios donde existe el habitat, incluyendo el provisionamiento del flujo de aguas subterráneas que mantienen los sistemas de pantanos, 4) eliminar el tráfico ilegal de vehículos fuera de caminos en el habitat viable, 5) examinar e identificar nuevos habitats y 6) inspeccionar y "monitorear" habitats conocidos para aprender más acerca del estatus poblacional en general así como la dinámica poblacional.

Como parte de un esfuerzo global para entender mejor el estatus de varias especies raras de libélulas dentro del bosque, los biólogos del HNF están "trabajando delineando mapas y examinando habitats viables para entender mejor la distribución de *S. hineana*" (Sjogren 2002). El condado de Mackinac contiene varias especies raras de insectos como parte de su diversa comunidad de invertebrados, y el esfuerzo puesto en proteger a la libélula esmeralda de Hine enfatiza la necesidad de una investigación más exhaustiva de la relación habitat-especies en el área.

Importancia económica

La importancia económica de la libélula esmeralda de Hine es principalmente el cada vez más popular pasatiempo de observación de la naturaleza. La observación de libélulas ha crecido bastante en los últimos años, y una prueba de ello es la publicación de una guía de campo sobre libélulas escrita por Dunkle (2002). Por su rareza y belleza, entomólogos y amantes de la vida silvestre considerarían una ocasión especial lograr un vistazo de un espécimen de Hine.

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News from Zoos

Confiscated Polar Bears Move to Accredited Zoos in U.S.

Six polar bears (*Ursus maritimus*) were confiscated from the Suarez Brothers Circus on November 5, 2002 in Yabucoa, Puerto Rico and moved to new homes in three U.S. zoos. The bears had been performing in the circus, but a recent U.S. Fish and Wildlife Service (USFWS) investigation uncovered violations of the Marine Mammal Protection Act, which resulted in their confiscation. The American Zoo and Aquarium Association's (AZA) Bear Taxon Advisory Group (BTAG), a cooperative team of bear experts from AZA-accredited zoos and aquariums, was asked by USFWS to determine placement in accredited zoological facilities and to arrange transport from Puerto Rico. Unfortunately, one of the bears died from complications during transit, but the rest arrived safely and are receiving appropriate veterinary care.

Early in the year, the AZA's BTAG also worked with USFWS to find an appropriate home for Alaska, a female polar bear. Alaska was confiscated from this same circus due to permit irregularities. She was moved to her new home at The Baltimore Zoo and has adjusted very well.

Zoos and Aquariums Help Promote Sustainable Seafood

The Bronx Zoo has joined with other AZA-accredited zoos and aquariums to encourage the general public to make better-informed decisions about seafood consumption. In October, they introduced *Go Fish*, the first Wildlife Conservation Society (WCS) seafood watch wallet card. In a partnership with Audubon's *Living Ocean's Program*, the Bronx Zoo-based WCS now offers informational wallet cards that explain sustainable seafood practices and rank many widely-offered seafood choices by the degree to which their farming is ocean-friendly. The cards and information brochure are available at the Zoo and other WCS facilities, including the New York Aquarium, Central Park Zoo, Queens Zoo and Prospect Park Zoo. They are also available on the Internet at www.wcs.org/gofish.

In a similar enterprise, the South Carolina Aquarium has come together with the South Carolina Coastal Conservation League, Johnson and Wales University, the University of South Carolina and South Carolina's finest chefs and restaurants to create the Sustainable Seafood Education Project. In order to highlight some of the current challenges facing ocean fisheries and promote consumption of locally-caught seafood, all participating restaurants will make every effort to obtain seafood from sustainable and, whenever possible, domestically produced and local sources. Due to concerns over certain species' status in the wild, these restaurants will also take Chilean sea bass (*Dissostichus eleginoides*), orange roughy (*Hoplostethus atlanticus*) and shark (Class Chondrichthyes, Subclass Elasmobranchi (part)) off their menus. Partnering with Johnson and Wales University, the aquarium's education staff will offer a series of programs for chefs, wait staff and culinary students to provide additional background on sustainable seafood issues. More information can be found on the South Carolina Aquarium's website at www.scaquarium.org.

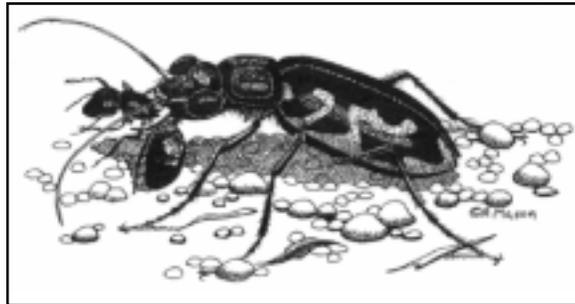
Florida Aquarium Receives Gulf Conservation Award

The Gulf of Mexico Program recently recognized the Florida Aquarium for taking positive steps to maintain the Gulf of Mexico ecosystems through their "Fantasy Island" project. Initiated in 1988, the Gulf of Mexico Program began as an effort to protect, restore, and maintain the health and productivity of the Gulf ecosystem in economically sustainable ways. The Gulf Guardian Award was created to honor the businesses, community groups, individuals and agencies taking action to help conserve the Gulf's resources. The Florida Aquarium's "Fantasy Island" project, a three-acre offshoot of two large spoil islands just north of the Alafia River in Tampa Bay, is a cooperative conservation and education project between the Aquarium, the Tampa Port Authority and other organizations. The island, overrun by invasive vegetation and experiencing erosion problems, was selected in 2000 to be rehabilitated by the "Fantasy Island" partnership. The site has been designed for the purpose of educating the public and school groups about habitats that are found in the Bay and will be incorporated into the Aquarium's local eco-tour programs. Focusing on the 30th Anniversary of the Clean Water Act, the Gulf of Mexico Program is especially proud to award the 2002 Gulf Guardian Award to an organization that has not only made the protection of local coastal waters a priority but is also working to educate the public about the importance of these fragile habitats.

Information for News from Zoos is provided by the American Zoo and Aquarium Association

FOCUS ON NATURE™ by Rochelle Mason

Insight into the lives of animals



The sun is up and the sand is getting warm. A well-camouflaged, 1/2-inch, brown-black and cream-colored **PURITAN TIGER BEETLE** (*Cicindela puritana*) races across the sand to catch an unsuspecting ant. Although he has wings to fly, he prefers to run using his long legs. Back when he was just a larvae, he caught food by hiding himself in his vertical burrow dug into dry, sandy soil. As soon as an insect meandered by he would spring out and grab the surprised meal with his strong jaws. Now, as an adult, he uses speed to win his meals. When the day ends, the tiger beetle burrows into the warm sand. As a heliophile, he will burrow anytime there is not enough sun and warmth. Beach habitats along the Chesapeake Bay in Maryland and the Connecticut and Sassafra Rivers provide homes for this beneficial, predatory insect. © 2000-2003 by endangered species artist Rochelle Mason. www.rmasonfinearts.com. (808) 985-7311

Instructions to Authors

The Endangered Species UPDATE is committed to advancing science, policy, and interdisciplinary issues related to species conservation, with an emphasis on rare and declining species. The UPDATE is a forum for information exchange on species conservation, and includes a reprint of the U.S. Fish and Wildlife Service's *Endangered Species Technical Bulletin*, along with complementary articles relaying conservation efforts from outside the federal program.

The UPDATE welcomes articles related to species protection in a wide range of areas including, but not limited to:

- Research and management of rare and declining species;
- Theoretical approaches;
- Strategies for habitat protection and reserve design;
- Policy analyses and approaches to species conservation;
- Interdisciplinary issues;
- Emerging issues (e.g., wildlife disease ecology).

In addition, book reviews, editorial comments, and announcements of current events and publications are welcome.

Subscribers to the UPDATE are very knowledgeable about endangered species issues. The readership includes a broad range of professionals in both scientific and policy fields including corporations, zoos, and botanical gardens, university and private researchers. Articles should be written in a style that is readily understood but geared to a knowledgeable audience.

Acceptable Manuscripts

The Endangered Species UPDATE accepts several kinds of manuscripts:

1. Feature Article — on research, management activities and policy analyses for endangered species, theoretical approaches to species conservation, habitat protection, and interdisciplinary and emerging issues. Manuscripts should be approximately 3000 words (8 to 10 double spaced typed pages).

2. Opinion Article — concise and focused argument on a specific conservation issue; may be more speculative and less documented than a feature article. These are approximately 450-500 words (About 2 double spaced typed pages).

3. Technical Notes/Reports from the Field — ongoing research, application of conservation biology techniques, species conservation projects, etc., at the local, state, or national level. These are approximately 750 words (3 double spaced typed pages).

4. Species at Risk — profiles of rare and declining species, including the following information: taxonomy, distribution, physical characteristics, natural/life history, conservation status, and economic importance. These profiles are approximately 750-1500 words (3 to 6 double spaced typed pages).

5. Book Reviews — reviews should include such information as relevant context and audience, and analysis of content. Reviews are approximately 750-1250 words (3 to 5 double spaced typed pages). Please contact the editor before writing a book review.

6. Bulletin Board — submissions of news items that can be placed on the back page. These items can include meeting notices, book announcements, or legislative news, for example.

Manuscript Submissions and Specifications

Submit the manuscript to:
Editor, Endangered Species UPDATE
School of Natural Resources and Environment
University of Michigan
430 E. University
Ann Arbor, MI 48109-1115

To submit your manuscript electronically, e-mail the manuscript as a Word file or rich formatted text (.rft) attachment to: esupdate@umich.edu.

Manuscripts should be typed, double-spaced, with ragged right margins to reduce the number of end of line hyphens. Print must be in upper- and lower-case letters and of typewriter quality. Metric measurements must be given unless English measurements are more appropriate, in which case metric equivalents must be given in parentheses. Statistical terms and other measures should conform to the *Council of Biology Editors Style Manual*. All pages should be numbered. Manuscripts must be in English.

Initial acceptance of a proposal or manuscript does not guarantee publication. After initial acceptance, authors and editors work closely on all revisions before a final proof is agreed upon.

Citations, Tables, Illustrations, and Photographs

Literature citations in the text should be as follows: (Buckley and Buckley 1980b; Pacey 1983). For abbreviations and details consult the Editor and recent issues of the Endangered Species UPDATE.

Illustrations and photographs may be submitted as electronic documents or as hard copies. If hard copies are submitted, the author's name and the figure number should be penciled on the back of every figure. Lettering should be uniform among figures. All illustrations and photos should be clear enough to be reduced 50 percent. Please note that the minimum acceptable resolution for all digital images is 300dpi.

Author credit instructions for each author of the article should accompany the manuscript.

Policy on Reviewing Proofs

Authors are asked to do the final copy editing of their articles. It is in the authors' power to save themselves and the journal the embarrassment of having to explain mistakes that could have been avoided.

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