presence of an ecological perspective in Congress and the Executive Branch. But in the meantime, when it comes to engaging with federal decision makers, ESA has chosen to invest in staff members who, working with ESA members, effectively represent the Society and the ecological community with the Legislative and Executive Branches.

Nadine Lymn
ESA Director of Public Affairs, Washington, DC (nadine@esa.org)

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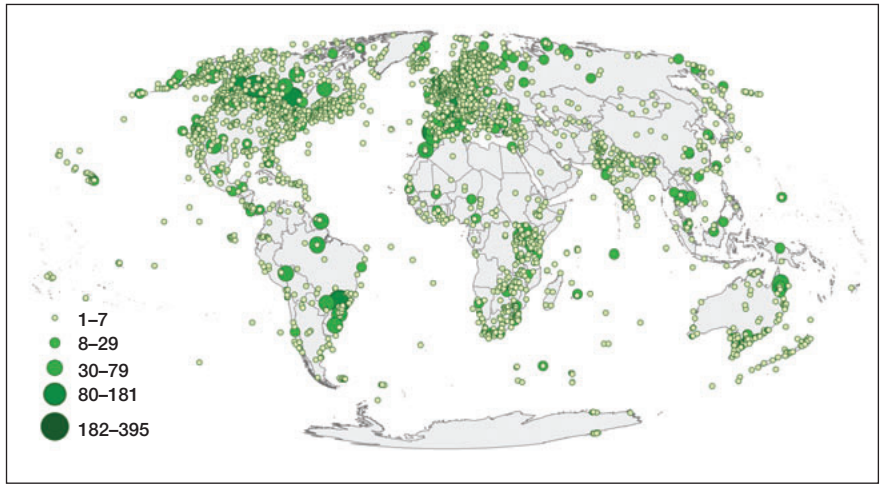

Figure 1. *The spatial distribution of the populations used to calculate the Living Planet Index (data from Collen* et al. *2009). The size of each point is proportional to the number of populations monitored.*

Global biodiversity monitoring

During 2010, the world has been celebrating the International Year of Biodiversity, for which governments had set the ambitious target of substantially reducing the rate of biodiversity loss. A recent assessment relying on the Convention on Biological Diversity (CBD) indicator framework (Butchart *et al.* 2010) showed continued biodiversity declines, but the assessment was constrained by incomplete spatial and taxonomical indicator coverage. Terrestrial species indicators covered only vertebrates, the Wild Bird Index included data only from Europe and North America, and a high proportion of the data in the Living Planet Index came from developed regions (Figure 1). However, the strongest pressures on biodiversity are in developing regions. The Group on Earth Observations Biodiversity Observation Network (GEO BON), a global biodiversity observation system, aims to integrate biodiversity-monitoring efforts and help fill these gaps (www.earthobservations.org/geobon.shtml).

GEO BON encompasses biodiversity monitoring from the genetic to the ecosystem level, including both terrestrial and aquatic taxa. For terrestrial species, much of the monitoring data has been collected by volunteers, with limited government investment, despite the legal obligations of many countries (CBD and other legal frameworks). A recent study suggests that, in France, species monitoring currently done by volunteers would cost 0.6 million to 4 million Euros per year if professionals were to be hired (Levrel *et al.* 2010). The fact that so many volunteers are willing to offer their time to contribute to monitoring suggests that society places a high value on biodiversity, and that governments should invest more to support and expand current monitoring initiatives.

Increasing support for monitoring is clearly justified by the major scientific contributions of well-developed monitoring datasets. For instance, long-term bird-monitoring efforts in the US and UK have helped in the understanding of the impacts of agricultural intensification (Gregory *et al.* 2005), climate change (Hitch and Leberg 2007), and many other basic and applied research questions (see a publication list at www.pwrc.usgs.gov/BBS/about/). The integration of such biodiversity datasets with spatial datasets of drivers of ecosystem change is one of the goals of GEO BON. This integration would advance ecological research, assist adaptive management, and provide improved validation of biodiversity scenario models used in assessing the impacts of climate and land-use change.

The expansion of species-monitoring programs to taxa and regions that have not yet been adequately covered is a daunting challenge. However, recent experiences in Europe suggest that the challenge could be met. In 1995, only five countries in Europe had implemented butterfly-monitoring schemes (van Swaay *et al.* 2010). By 2009, that number had tripled, largely because of capacity-building initiatives and the identification of a common goal: developing a European Butterfly Indicator. Similarly, the number of European countries with national bird-monitoring programs increased from three in 1980 to over 20 by 2005 (Gregory *et al.* 2005). While the conditions for expanding monitoring already existed in Europe, owing to a large number of skilled volunteers and strong financial and institutional capacity, there are many other regions where capacity could be strengthened with modest financial assistance.

We estimate that initiating integrated species-monitoring programs for selected terrestrial vertebrates, butterflies, and key plants in regions such as sub-Saharan Africa, South America, and East Asia could require as little as US$50 000 per country per year. These funds could support volunteer-based projects or expert-based programs developed in concert with ongoing management and research projects. We call for the development of pilot projects in these under-monitored regions, with the goal of providing rigorous population trends for a set of taxa by 2020, in time for the

next global biodiversity targets.

Henrique M Pereira[1*], Jayne Belnap[2], Neil Brummitt[3], Ben Collen[4], Hui Ding[5], Mario Gonzalez-Espinosa[6], Richard D Gregory[7], João Honrado[8], Rob HG Jongman[9], Romain Julliard[10], Louise McRae[4], Vânia Proença[1], Patrícia Rodrigues[1], Michael Opige[11], Jon P Rodriguez[12], Dirk S Schmeller[13], Chris van Swaay[14], and Cristiana Vieira[8]

[1]Universidade de Lisboa, Portugal [*](hpereira@fc.ul.pt); [2]US Geological Survey, US; [3]Natural History Museum, UK; [4]Zoological Society of London, UK; [5]Ministry of Environmental Protection, China; [6]El Colegio de la Frontera Sur, Mexico; [7]Royal Society for the Protection of Birds, UK; [8]Universidade do Porto, Portugal; [9]Alterra, Netherlands; [10]Muséum National d´ Histoire Naturelle, France; [11]Nature Uganda, Uganda; [12]Instituto Venezolano de Investigaciones Científicas, Venezuela; [13]CNRS, France; [14]Vlinderstichting, Netherlands

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Costs and benefits of ivory-billed woodpecker "re-discovery"

Several years ago, the purported re-discovery of the ivory-billed woodpecker (*Campephilus principalis*) in eastern Arkansas generated lively discussion in renowned scientific journals. The debate concerned both the central question of whether the bird videotaped in April 2004 really was an ivory-billed woodpecker (eg Fitzpatrick *et al.* 2005; Sibley *et al.* 2006) and the controversy around the resulting species recovery plan and its costs (McKelvey *et al.* 2008; Dalton 2010): was $14 million pointlessly spent?

In Sweden, much more money has already been allocated toward another species of woodpecker (white-backed woodpecker, *Dendrocopos leucotos*) – one that is not even considered threatened in Europe. Cumulatively between 2005 and 2008, over $25 million was assigned for the recovery of this species, and continued investment is expected in the near future. Even if a single-species conservation approach may be criticized – particularly when such a large sum of money is involved – Swedes seem to accept the value of the umbrella species concept (sensu Roberge and Angelstam 2004). Woodpecker conservation is most often related to large-scale forest habitat protection and restoration, and white-backed woodpecker recovery efforts should consequently benefit over 200 threatened organisms associated with this species' habitat.

In the case of the ivory-billed woodpecker, funding was mostly used for habitat preservation (Dalton 2010), namely that of the highly contracted lowland primary forests of the southeastern US. This implies that the monetary support may have benefited many other species as well. Therefore, even if the chances for the (assumed extant) ivory-billed woodpecker's population recovery remain slim, we do not think the amount spent was "wasted". However, a multi-species cost–benefit analysis could help to better quantify this assertion.

Grzegorz Mikusinski[1,2*], Malgorzata Blicharska[2], and Peter WJ Baxter[3]

[1]Grimsö Wildlife Research Station, Department of Ecology, Swedish University of Agricultural Sciences, Riddarhyttan, Sweden [*](grzegorz.mikusinski@ekol.slu.se); [2]School of Forest Management, Swedish University of Agricultural Sciences, Skinnskatteberg, Sweden; [3]The Ecology Centre, School of Biological Sciences, The University of Queensland, St Lucia, Australia

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