Dear colleagues,

we are pleased to invite you to the workshop on stable isotopes that we are preparing by reason of the inauguration of the laboratory of stable isotopes (LIE) at the Estación Biológica de Doñana (EBD). This workshop will take place on October the 24th and the 25th at the EBD facilities.

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<td>10:30-11:00 Carola Sanpera (UB)</td>
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<td>11:00-11:30 José Antonio Donázar (EBD)</td>
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<td>11:30-12:00 Break</td>
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<td>Isotopic round table</td>
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Suitability of stable isotopes for monitoring coastal ecosystem recovery following the Prestige oil spill

Carola Sanpera Trigueros (Universitat de Barcelona)

In November 2002, the tanker Prestige was wrecked off the Atlantic north-west coast of Spain (Galicia), releasing 60,000 t of oil products, which dispersed from Northern Portugal to France and contaminated key marine ecosystems such as the Parque Nacional de las Islas Atlánticas. We monitored the two main seabird species breeding in this area, the European shag (Phalacrocorax aristotelis) and the Yellow-legged gull (Larus michahellis), to gain insights into long-term alterations in food web dynamics and to investigate the persistence of oil pollution in the affected coastal ecosystem. In order to achieve that, we analyzed stable isotopes ($\delta^{13}C$, $\delta^{15}N$ and $\delta^{34}S$) and heavy metal concentrations (Hg, Cu, Pb, Zn, Cr, V and Ni) in three affected colonies during seven post-spill years (from 2003 to 2009), and compared it with pre-spill values (spring/summer 2002). Although most short-term studies published until now indicate a strong initial impact during the first year after the spill with recovery by 2004, $\delta^{15}N$ and Hg, Pb and Cu concentrations of studied seabird populations point to changes in the food web structure and chronic oil pollution in the affected area for at least three years after the spill and provides the strongest evidence to date on the lasting impact of the Prestige accident in the Galician marine ecosystem.

Gaining insights into mast ecology: isotope tracking of pulsed resources in the mammalian community of a European primeval forest

José Antonio Donázar (Estación Biológica de Doñana)

Through the determination of carbon and nitrogen isotope signatures in hair samples of the mammal community (50 species) of the Bialowieza forest (NE Poland) we first examined the trophic structure of the community; Mammal community showed a classical structure with some overlap between primary consumers and predators. Bats were much skewed towards negative carbon values perhaps as a consequence of the
exploitation of insect linked to aquatic habitats. Our second objective was to go into the
trophic response of a tandem of competing rodent species in relation to cycling crops of
tree seeds. We found that during mast the two species overlapped. When food resources
became scarcer the subordinate species changed to other apparently less-profitable food.
These results might shed light on the causes of small rodent population cycles.

(24/10/2011) 12:00-12:30

elena angulo

(24/10/2011) 12:30-13:00

caut

(24/10/2011) 13:00-13:30

Huellas isotópicas del Cambio Global en el Sur de la Peninsula Ibérica

Antonio Delgado (Laboratorio de Isótopos Estables del Zaidin)

La quema de combustibles fósiles están incrementando la concentración de CO₂
atmosférico, pero también cambiando su composición isotópica, lo que está
produciendo cambios en la temperatura y las condiciones hídricas a escala de todo el
planeta. Sin embargo, los efectos a escala local pueden ser muy diferentes, lo que ha
quedado reflejado en la señal isotópica de la producción primaria y en toda la cadena
trófica de diferentes ecosistemas. Estas huellas isotópicas pueden aportar datos
cuantitativos difícil de cuantificar/integrar con otros métodos.

(24/10/2011) 15:00-15:30

Feeding strategies in social groups of long finned pilot whales

R. de Stephanis¹, García Tiscar S², P. Verborgh², R. Esteban-Pavo², C. Guinet³

¹: EBD-CSIC, Departamento de Biología de la Conservación, Americo Vespucio S/N, Sevilla.
²: CIRCE, Cabeza de Manzaneda 3, Algeciras, Cadiz, España.
³: CEBC-CNRS, Villiers en Bois, Chizé, France.

The Strait of Gibraltar is inhabited throughout the year by a group of pilot whales
(Globicephala melas), but their spatial distribution varies between Summer and
Autumn. In this presentation, we have used carbon ($^{13}\text{C}/^{12}\text{C}$) and nitrogen ($^{15}\text{N}/^{14}\text{N}$) stable isotope signatures to investigate the differences in diet amongst seasons, sex and stable social units. Skin samples were collected from 56 individually photo-identified pilot whales during Autumn 2005 and Summer 2006. These individuals were genetically sexed and their isotopic signature determined. The level of inter-individual association both within and between stable social units were compared to Euclidean distances between individual isotopes signatures. No differences in either $\delta^{15}\text{N}$ or $\delta^{13}\text{C}$ were found according to the sex of individuals, but significant seasonal differences were found in $\delta^{15}\text{N}$, although not in the $\delta^{13}\text{C}$ values. This suggests that pilot whales are resident year round in the Strait, a finding supported by independent photo-identification. The variation in $\delta^{15}\text{N}$ could reflect a shift in pilot whale diet through the year, with pilot whales feeding at a higher trophic level in Autumn compared to Summer. This could also represent a change in the diet of pilot whale prey species. The $\delta^{13}\text{C}$ values were significantly different amongst the four stable social units sampled and individual $\delta^{13}\text{C}$ values were significantly related to the level of inter-individual association, while no relationship was found for $\delta^{15}\text{N}$. These results suggest that within the same general area (i.e. the Strait of Gibraltar), there is some level of specialisation in habitat or prey choice between pilot whales social units.

Identifying the different Citril Finch Meta-populations from isotopic signatures

**Emilio Pagani & Juan Carlos Senar (Museu de Ciències Naturals de Barcelona, UA CSIC)**

The Citril Finch (Serinus citrinella) is an alpine small Fringillidae bird with a typical meta-population structure associated to the different southwestern European mountain chains. The different populations may differ in diet, some populations feeding mostly on pine seeds, other on herbs. The aim of the study is to characterize the different populations with different isotopic signatures. The difference between populations could be due either to different diets or/and to geographic differences. First preliminary analyses showed that the different populations in SW Europe differed in C and N signatures. Analyses were carried out on feathers and nails. However, we did not find a clear pattern.

Our first hypothesis is that geographic isotopic differences may be due to different proportions of pine seeds and herbs in their diet. To test this we will analyze two subpopulations (within the eastern Pyrenees population), located in different slopes of the same mountain (Port del Comte, Pyrenees, NE Spain) which we know to differ in diet. The Bofia population mainly feeds on herbs meanwhile the Vansa population mainly feeds on pine seeds (Pinus uncinata & P.sylvestris). If the two subpopulations differ in C and N isotopes, and this pattern can be extended to differences found in
isotopic composition from the larger sample from SW Europe, we could support that a
degree of difference between populations is due to different diets. Alternatively,
differences found may be due just to geographic differences. To support this view we
intend to analyse D and O isotopes in Citril finch feathers and nails, but also in pine
seeds (Pinus sylvestris) and herbs (Taraxacum officinale) collected at the different
populations. For the vegetal samples we will also analyse C and N isotopes, as in the
previously collected feathers. Our aim is to test if the differences found in the plants
 correspond with those found in Citril Finch feathers and/or nail, hence supporting a
graphic difference.

(25/10/2011) 12:00-13:00

Applications of isoscapes to global wildlife migration studies: A decade of progress
and the road ahead

Leonard I. Wassenaar (Environment Canada)

Critical to understanding the ecology of migratory species is the ability to quantitatively
link geographical regions used by individuals or populations during their life cycle.
Traditional approaches to determine migratory connectivity over geospatial scales have
relied on extrinsic mark & recovery methods – which are largely unsuccessful for small
or non-game animals. The use of intrinsic markers like stable isotopes in animal tissues
offers a new and alternative approach.

The isotope approach relies on the fact that food web stable isotopic values are reflected
in the tissues of organisms, and that organisms migrating between isotopically distinct
biomes carry with them spatial information on the location of previous feeding.
Knowing a priori the global or regional spatial patterns of various stable isotopes in the
landscape (Isoscapes) allows us to infer geographical region or origin of migrating
animals.

This presentation provides an overview of a decade of research and ongoing
improvement in stable-isotope assays and approaches (primarily δD, δ¹³C, δ¹⁵N, δ³⁴S)
aimed at unraveling migration linkages in migratory animals (e.g. examples of birds,
insects will be illustrated). The isoscape approach has been most successful using
hydrogen isotopes owing to predictable global spatial isotopic patterns, but other
isotopic tracers are increasingly being used. Combined with GIS and forthcoming geo-
statistical tools, “Isoscapes” represents an increasingly powerful tool in wildlife
migration and forensics research.