Scientific rationale for the proposed CIESM North Levant Marine Peace Park

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INTRODUCTION

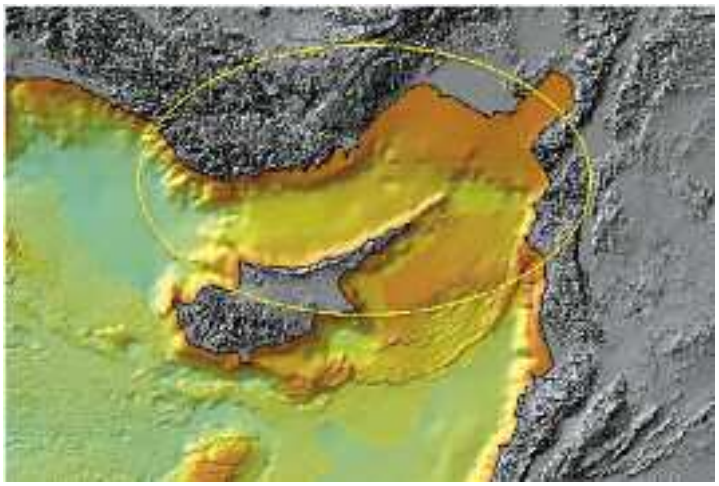

Figure 1. Shaded bathymetry of the CIESM North Levant Marine Peace Park (within yellow circle) based on swath bathymetry (DTM at 500m grid). Adapted from L. Brosolo and J. Mascle (2007).

This report summarizes the major and peculiar features of Taseli Strait between Anatolia and Cyprus, within the context of the eastern Mediterranean ecosystem (Figure 1). For this, we consider the phytoplankton and zooplankton, essential building blocks of pelagic ecosystems, the ichthyoplankton that determines/ensures the future of fish stocks, the gelatinous organisms which form trophic dead-ends in pelagic ecosystems, and endangered and threatened species protected by international conventions and national laws. Life histories, habitats, spawning, nursery and overwintering grounds are evaluated to the extent that available data permits.

The oceanography of the Eastern Mediterranean is characterized by a complex system of mesoscale eddies, jets and meanders entrained and embedded in the general cyclonic circulation (Hamad *et al.*, 2005; CIESM, 2005a). Although some of the main oceanographic features persist, the general circulation is subject to remarkable inter-annual variability (Özsoy *et al.*, 1991; 1993). One of the most important temporal variations is the geographical range achieved by the (modified) Atlantic Water (MAW). This water mass enters the Levant Basin through the Cretan Passage, and the core of the jet branches southwest of Cyprus. One branch passes Cyprus to the south and reaches the eastern boundary of the basin. In some years, an arm turns north, advecting a considerable amount of the Atlantic water into the NE Levant in the form of a subsurface filament (Özsoy *et al.*, 1993). This is the main motive force of the Asia Minor Current that feeds Taseli Strait. However, at other times the mainstream flow is blocked in the Latakia basin, between Cyprus and Syria (Özsoy *et al.*, 1991).

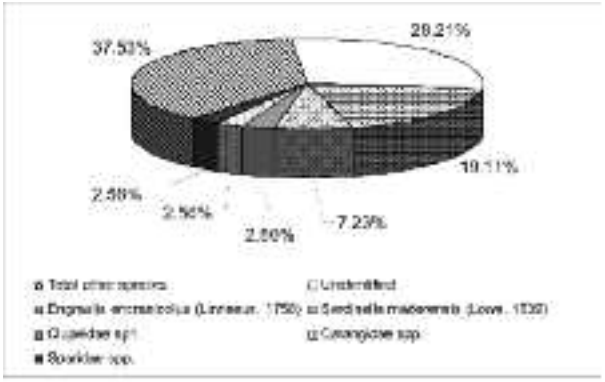

Figure 2. Percentages of dominant yolk sac larval fish during the study periods (Ak and Uysal, 2008).

Productivity in the north-eastern Mediterranean is characterised by extreme oligotrophy (Yılmaz *et al*., 1994; Ediger and Yılmaz 1996; Ediger *et al.*, 2005). However, nearshore waters are typical ROFI (Regions of Freshwater Influence) with significant inputs from small to medium scale rivers flowing into the region (Dogan-Saglamtimur and Tugrul, 2004). This feature leads to strong contrasts between the continental shelf waters and those offshore in term of productivity.

Phytoplankton productivity, mainly induced by riverine inputs, is generally unimodal; but in some years increased productivity is observed in late summer. This variable feature is associated with intrusions of modified Atlantic Water into the area (Uysal *et al.*, 2008).

The spatial variability in chlorophyll shows that the spring bloom is more pronounced in the eastern part of the basin, especially in the inshore waters. The bloom productivity is absorbed by the ecosystem until summer. Then in autumn a remarkable increase is observed in Taseli Strait.

The phytoplankton in the area is composed of three main groups, diatoms, dinoflagellates and chrysophytes. The first two groups always contribute 90% or more of total phytoplankton cells. Given that the diatom to dinoflagellate ratio may be used as an indicator of eutrophication level, the phytoplankton composition in the area shows eutrophic character relatively to the extreme oligotrophy of the Eastern basin. Taseli Strait is distinguished from the rest of the basin by the longer duration of the period when diatoms exceed dinoflagellates, indicating that the spring bloom lasts longer and so provides a longer nutritious state.

To sum up, despite the extreme oligotrophy of the eastern Mediterranean, Taseli Strait is fed by the eutrophic waters of the NE Levant Sea, especially during late summer. Also, intrusions of Atlantic Water additionally augment productivity in the area. These features increase the nutritious quality of the Taseli region for zooplankton at early life stages.

Ichthyoplankton surveys carried out in the NE Levant Sea show a diversified composition, within Taseli Strait alone a total of 125 larval fish taxa belonging to 39 families are recorded (Ak, 2004; Ak and Uysal, 2008). Among them small pelagics (mainly anchovy) are the most commonly observed species (Figure 2). It seems that productivity in the lower trophic levels provides suitable spawning and nursery areas for small pelagics in Taseli Strait.

Despite their slight commercial importance in Taseli Strait, small pelagics are among the dominant fish. Although present in summer, they do not then form dense schools as they do in winter. Dispersed aggregations are not suitable for exploitation, but nevertheless provide an important food source for the larger fish such as juvenile bluefin tuna and hake.

The most important large pelagic fish of the region is the bluefin tuna (*Thunnus thynnus*). One of the four major spawning grounds of the species is located within Taseli Strait (Figure 3). In a survey of the area, the largest concentration of bluefin larvae was found in Taseli Strait (Karakulak *et al.*, 2004 – Figure 4). Bluefin larvae bluefin, increase in size from east to west. The eggs and larvae of bluefin are very small compared to the adult size of the species, and development of the larvae is very rapid. Larvae usually hatched within 24 hours of spawning, so that the occurrence of larvae in an area indicates that the adults spawned in the close vicinity.

Figure 3. Most important spawning ground of bluefin tuna (*Thunnus thynnus)* in the Mediterranean. Numbers in grey circles are spawning ground located in the western Mediterranean; the black spot indicated by the black arrow is the major spawning ground of the species (from Karakulak *et al.*, 2004).

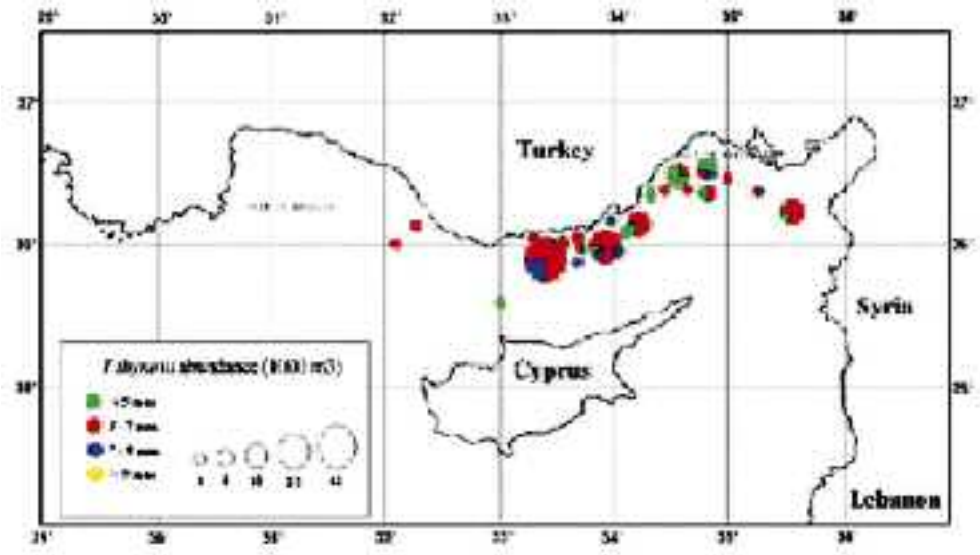

Figure 4. The position, abundance and length composition of bluefin tuna (*Thunnus thynnus*) larvae in the Levant Sea (Oray and Karakulak, 2005).

Amongst the demersal species, hake is commercially important. This species undergoes ontogenetic migrations between the continental slope and upper shelf area; juvenile hake migrate to the upper shelf to fulfil their changing dietary requirements (Carpenteri *et al.*, 2005). A trawl survey carried out in the area showed that the majority of hake sampled were juveniles (95% of the samples ranged from 12 to 28 cm, representing the 0 and I year classes). This group probably comprises those changing their feeding behaviour from benthivorous to piscivorous, hence in search of small pelagic fish in shallow waters. The sudden increase in the density of juvenile hake in the area may indicate that the spawning and nursery grounds are located within Taseli Strait (Gücü, 2006).

The range of *Posidonia oceanica* ends on the north coast of Taseli Strait (Figure 5 – Gücü and Gücü, 2002a). Historical records (Cirik, 1991) show that these meadows have regressed almost 10 km westwards within the last 25 years. Temperature, salinity and mechanical stress by bottom trawlers seem responsible for the absence of *Posidonia oceanica* in the Levant Sea (Celebi *et al.*, 2006). Surprisingly, this northeastern limit of the species coincides with a remarkable gradient in the distribution of Lessepsian fish (Figure 6 – Gücü and Bingel, 1994; Gücü and Gücü, 2002b).

Figure 5. The position of northeastern boundary of the *Posidonia oceanica* in the Mediterranean.

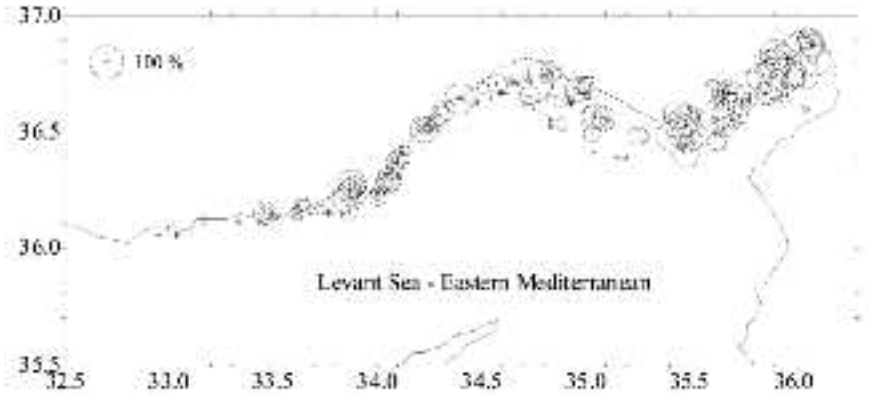

Figure 6. Percentage of Lessepsian fish in the total catch (Gücü and Bingel, 1994).

Marine turtles are important elements of the conservation value of Taseli Strait. The area provides important nesting sites for *Chelonia mydas* and *Caretta caretta* (Figures 7, 8 and 9).

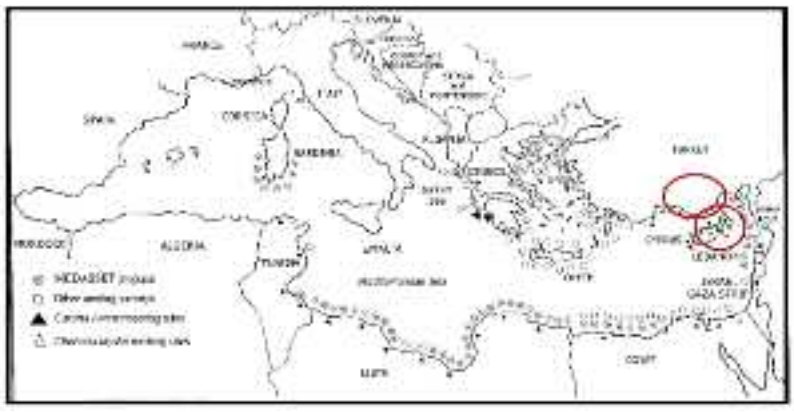

Figure 7. Nesting beaches of the green turtle, *Chelonia mydas*, in the Mediterranean (Venizelos *et al.*, 2005). The upper red circle is enlarged in Figure 8 and the lower circle in Figure 9.

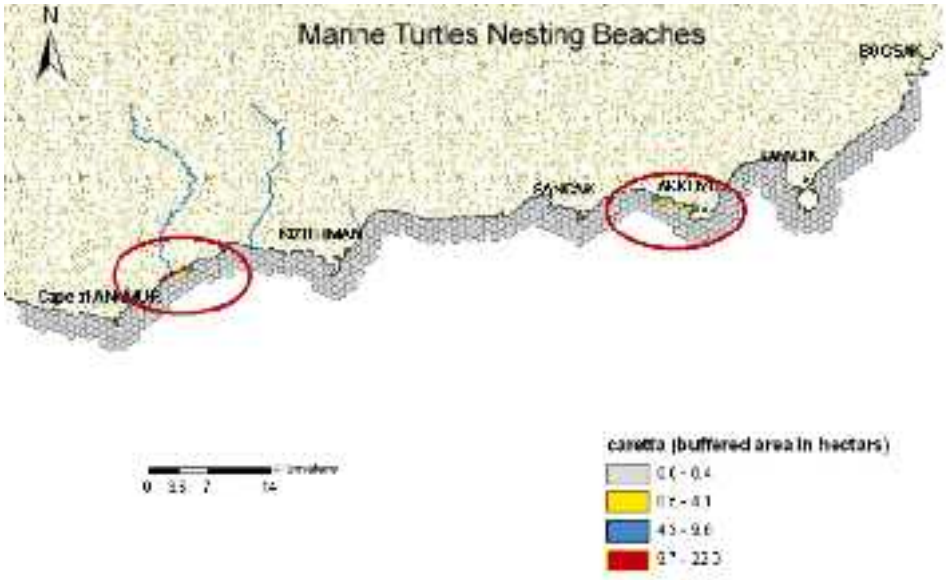

Figure 8. Important marine turtle nesting sites between Tasucu-Anamur (from Sakınan, 2008).

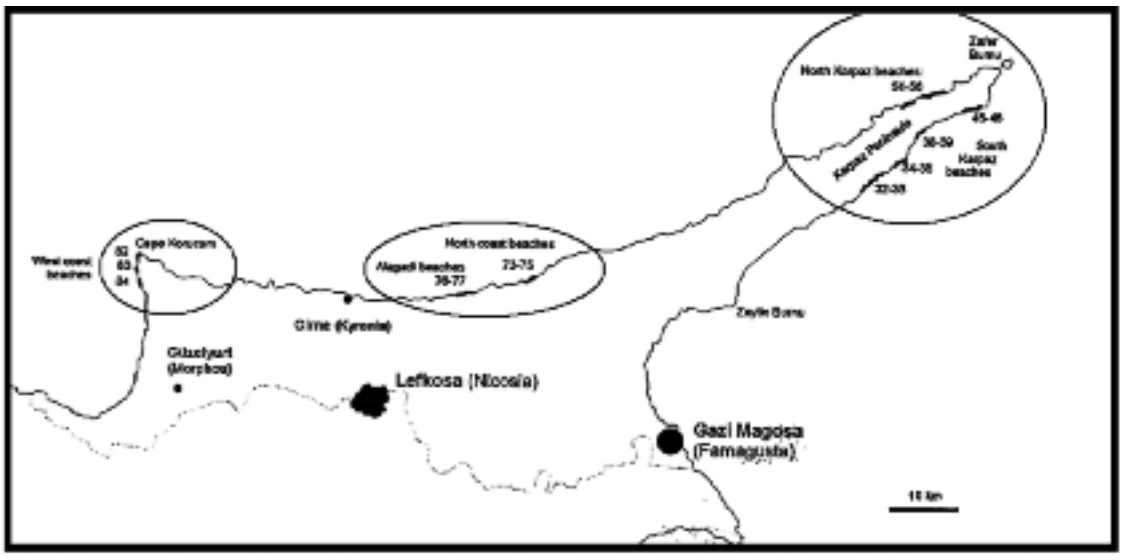

Figure 9. Nesting beaches used by green turtle, *Chelonia mydas* in northern Cyprus (Kasparek *et al.*, 2001).

In addition to the nesting beaches, the turtles, especially subadult green turtle (*Chelonia mydas*) are also observed in the shallow waters rich with sea grass meadows. The *Cymodocea nodosa* beds are the major feeding grounds of the species. The dense meadow off Babadıl creek is therefore a favourable fishing ground for the species. The juveniles are observed frequently in the meadow.

One of the very few nesting sites of Audouin's gull (*Larus audouinii*) is on the Gilindire islands in Aydıncık. Another may lie in northern Cyprus. Nesting is in spring, and the juveniles feed locally before the migration in late summer. The main accumulations of feeding juveniles are observed in flocks around Cape Sancak and Besparmak Island. Positions of Audouin's gull sightings are given in Figure 10.

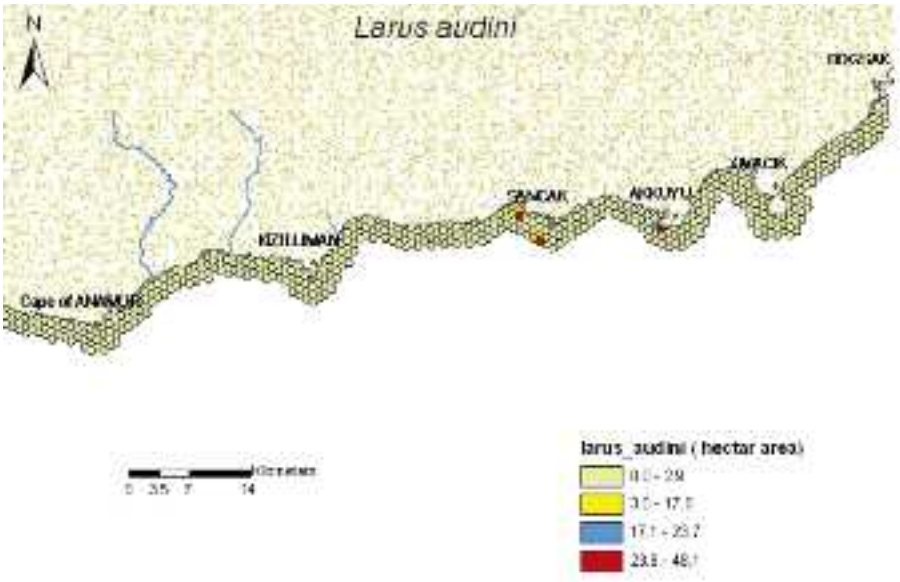

Figure 10. Sightings of Audouin's gull (*Larus audouinii*) in the area between Tasucu and Anamur (Sakınan, 2008).

The Mediterranean monk seal is perhaps the most critically threatened element of the ecosystem. Its occurrence in the NE Levant Sea has been investigated, and there are important breeding habitats in Taseli Strait, on the west coast of Mersin (Gücü *et al*., 2004) and in northern Cyprus (Figures 11, 12; Gücü *et al*., 2009a). It was estimated that around 40 individuals inhabit the area (Gücü *et al*., 2009b) with an average fecundity of 0.22 (Gücü and Ok, 2006).

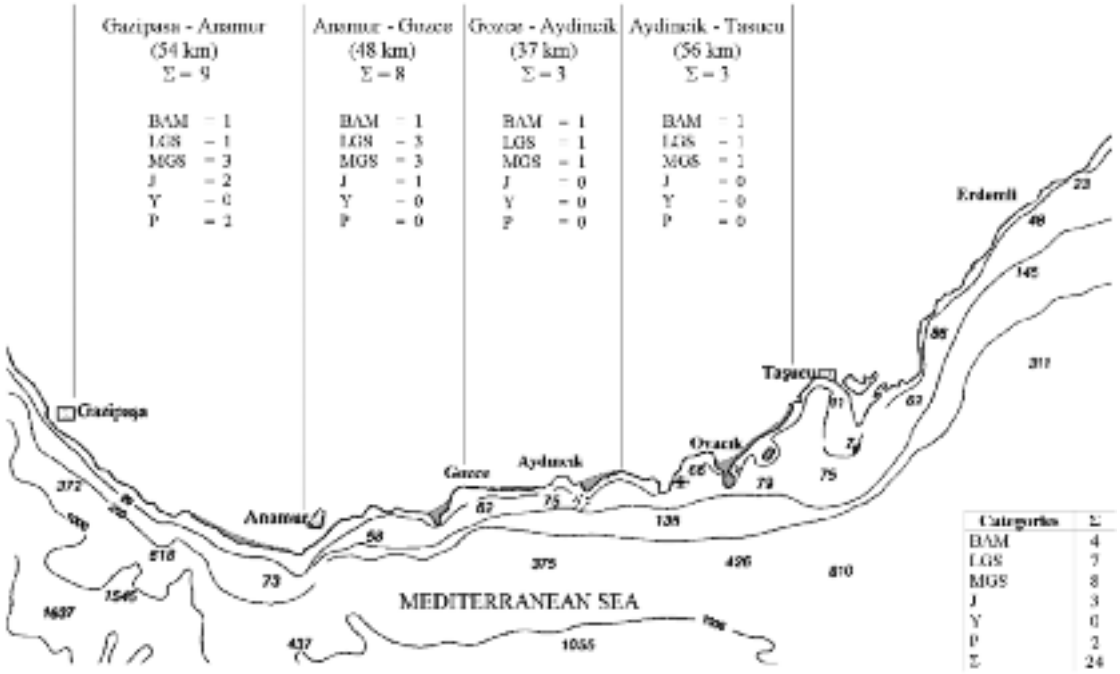

Figure 11. Distribution of monk seals along the Cilician Basin with the arbitrary ranges of the sub-regions, the total numbers of individuals using each sub-region, and the sub-group category compositions. The data presented in the bottom right corner summarize the total numbers of seals in each category.

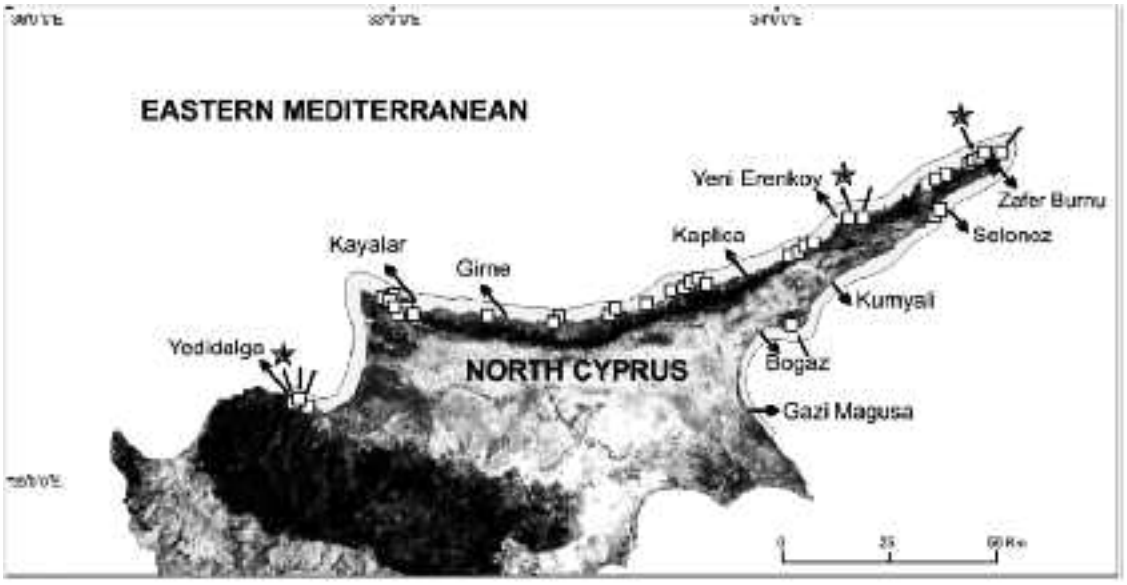

Figure 12. Map showing the position of the main fishing ports (arrows); monk seal sightings recorded by the research team (⋆); the positions of all discovered caves (□), monitored caves (I), and the survey tracks (gray line along the coast).

The areas were marked for conservation in 1997. The surroundings of the identified breeding caves, and the foraging areas have been designated as "No-take-zone" in the sea, and on the land as "1st Degree Natural Asset".

Existing MPAs

Several studies of the area between Tasucu and Anamur, particularly those by the Middle East Technical University Institute of Marine Sciences, have identified high values of marine biodiversity. Based on these studies, a 75 km stretch of coast has been declared a 'first degree natural asset' by the Ministry of Culture, Adana Counsel of Protection of Natural and Cultural Heritage. Additionally, to facilitate recovery of the depleted ecosystem, the entire territorial waters in front of 16 nm of the coast between Cape Sancak, Aydıncık, and Cape Kızılliman, Bozyazı, is

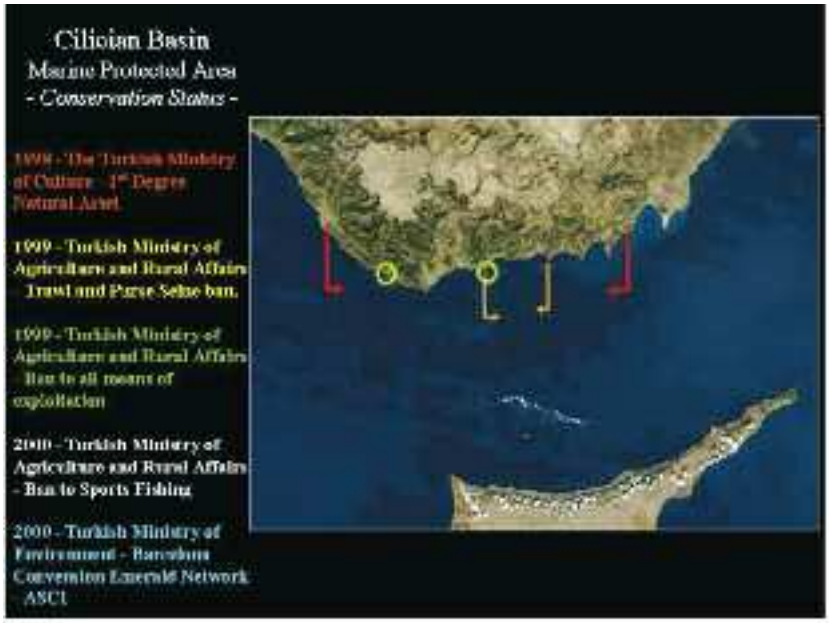

Figure 13. Conservation status of Taseli Strait area.

closed for industrial fishery by the decisions of the Ministry of Agriculture and Rural Affairs, General Directorate for Protection and Control. Finally in 2000, the Ministry of Environment decided to include the area within the Emerald Network of the Barcelona Convention. Although national nature protection legislation does not include the term, according to the criteria proposed by IUCN (International Union for the Conservation of Nature) the area (Figure 13) is defined as a “Marine Protected Area”.