Custodians of rare and endangered Lepidoptera (COREL)

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Introduction

The conservation of insects generally and of butterflies in particular has gained momentum in the last few decades in many parts of the world as recent publications show (Pullin, 2005; Samways, 2005; New, 2009; Van Swaay et al., 2009; McGeoch et al., 2011). South Africa has not lagged far behind in this enterprise, and following the establishment of the Lepidopterists’ Society of Africa (LepSoc) in 1983 there have been many efforts to alert the authorities and the public at large to the plight of our butterflies (e.g. Henning, S.F. & G.A., 1989, 1996; Edge, 2005a; Henning et al., 2009). LepSoc also participated in the Southern African Butterfly Conservation Assessment (SABCA) project, from which the publication of a revised Red List for butterflies in southern Africa is pending (Mecenero et al., in prep.). This will provide butterfly conservation with an even sounder base of scientifically accumulated data. LepSoc has also gained increasing expertise in butterfly conservation, following research and successful conservation efforts with butterflies such as the Brenton Blue (Orachrysops niobe) (Edge, 2011), the Roodepoort Copper (Aloeides dentatis dentatis) (Deutschländer & Bredenkamp, 1999), and the Heidelberg Copper (Chrysoritis aureus) (Henning & Roos, 1999).

Mecenero et al. (in prep.) identify 61 taxa as threatened in terms of the IUCN (2010) categories and criteria (Table 1). Drawing inspiration from SANBI’s successful Custodians of Rare and Endangered Wildflowers programme (CREW, 2009), LepSoc has decided to launch a programme called COREL (Custodians of Rare and Endangered Lepidoptera), to promote and ensure the conservation of all butterflies and moths Red Listed as threatened in South Africa. In view of LepSoc’s currently limited manpower and financial resources, COREL will initially focus on the Critically Endangered (CR) butterfly and moth taxa, of which there are currently 15, including the moth Callioratis millari. Taxa in this category are at imminent risk of extinction, and five of these have been assessed as possibly extinct (Mecenero et al., in prep.). For each CR taxon LepSoc has identified one or more custodians who have agreed to take the primary responsibility for monitoring and preventing extinction of the taxon. The COREL programme may later be expanded to
include CR taxa occurring in the rest of Africa and the Endangered, Vulnerable and Data Deficient butterflies and moths, when resources become available.

Table 1 Threatened South African butterflies (after Mecenero et al., in prep.)

<table>
<thead>
<tr>
<th>Red List category</th>
<th>No. of taxa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critically Endangered</td>
<td>14</td>
</tr>
<tr>
<td>Endangered</td>
<td>28</td>
</tr>
<tr>
<td>Vulnerable</td>
<td>19</td>
</tr>
<tr>
<td>Data deficient</td>
<td>8</td>
</tr>
</tbody>
</table>

Threats to Critically Endangered butterflies and moths

The general threats to South African butterflies are dealt with in Henning et al. (2009) and Mecenero et al. (in prep.), and most of these threats would also apply to moths. Critically Endangered butterflies and moths have already undergone much general habitat loss and fragmentation through a combination of agriculture, forestry, urbanization and mine or industrial developments, and generally have only one or a few extant localities. Even if these localities are saved from destruction, further degradation of habitats can continue by alien plant invasions and loss of natural processes such as fire and herbivore activities. Understanding these endangering processes is of critical importance and requires both an intimate knowledge of the butterfly’s or moth’s life history and interactions with other organisms, but also the functioning of the ecosystem within which the butterfly or moth occurs. The Brenton Blue experience provides an informative case study on the entire butterfly conservation process and much can be learnt from studying this (Edge, 2011).

Responsibilities of Custodians

Review the status of the CR butterfly or moth

The custodian(s) will gather data from all available sources, and compile a dossier that will include as a minimum:

- Copies of the published reference works on the butterfly or moth
- A brief summary of its conservation history
- A summary of what is known about its life history and ecology
- Number and location of known populations (GPS coordinates)
- A rough estimate of the population size(s)
- Landowner details and land use for each site
• Map of each site showing topography and extent of occurrence of all populations
• Vegetation description as per Mucina & Rutherford (2006) or other sources
• Current or anticipated threats to the butterfly or moth’s habitats
• Conservation measures currently in place

Secure the remaining localities and commence monitoring
Some CR butterflies and moths occur in national parks or nature reserves, but most are found on private land. Whichever is the case, it is essential to get the cooperation of the relevant conservation authorities or the landowners. Once this has been secured, custodians need to obtain permission to carry out research, and arrange for ongoing annual population monitoring (counting).

Search for more localities
If no populations are known of or if only one population is extant, custodians need to plan and execute systematic searches for the CR butterfly or moth. Such searches can be informed by species distribution modelling and use of GIS technology, such as employed by Armstrong (2004).

Research
An important function of the custodian(s) is to recruit and lead a team of researchers. A successful campaign will need expertise from several specialist scientists – including botanists, ant experts (where applicable) and ecologists. Universities should be approached to help – research on CR butterflies or moths can make wonderful postgraduate research projects. The researcher, in conjunction with the custodian(s) should assess the state of knowledge of the CR butterfly or moth and identify research priorities. Some of the key areas for investigation are likely to be:

• To establish the full details of the life history, including trophic resources of larval and adult stages, as well as interactions with other organisms such as ants.
• Defining all the abiotic and biotic ecological factors that impact on the survival of the CR butterfly or moth population, leading to a description of its unique ecological niche.
• What are the current threats to the surviving populations and how can they best be mitigated?
• Using all the information gained to develop and implement a habitat management plan for each population of the CR butterfly or moth.
Fundraising
The funding needed to conduct the necessary research and later habitat management is to be estimated using the template given in Table 2. It is assumed that the relevant universities will cover the academic costs of the postgraduate students, and that applications for research bursaries will be made. LepSoc is also endeavouring to raise funds for the COREL programme by approaching corporations that have operations in the areas where the endangered Lepidoptera occur. At present the Brenton Blue Trust plays an important role by providing financial support for the Knysna CR butterflies (*Orachrysops niobe*, *Thestor b. brachycerus*).

Regulations for collecting at known localities of CR butterflies or moths
Collecting of CR butterflies or moths at known localities is already restricted in accordance with the LepSoc Code of Conduct, and the LepSoc Council is empowered to establish the “specific conditions” referred to in the Code for each CR butterfly or moth. The custodian(s) for each CR species will recommend to the Council on what these conditions should be and may be authorised to issue permits to persons wishing to obtain specimens for study. If there are existing regulations or legislation or that prohibit or restrict the collecting of specimens such regulations would have to be complied with. All CR taxa will be listed under the new Threatened or Protected Species (TOPS) regulations soon to be introduced by the Department of Environmental Affairs. These regulations will not only restrict collecting of CR species, but more importantly will protect their habitats from alteration as well as destruction.

### Table 2 Template to establish a budget for monitoring and research into Critically Endangered butterflies and moths

<table>
<thead>
<tr>
<th>Expenditure items</th>
<th>Quantity</th>
<th>Budget (R)</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel costs for monitoring</td>
<td>km</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel costs for new locality searches</td>
<td>km</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodation</td>
<td>nights</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sustenance*</td>
<td>Field work days</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Soil analysis</td>
<td>samples</td>
<td></td>
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<tr>
<td>Research materials</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Plant identification</td>
<td></td>
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<td></td>
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<tr>
<td>Equipment (e.g. weather recording)</td>
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<tr>
<td><strong>Habitat management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Clearance of alien species</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Controlled burns (if appropriate)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Disturbance simulation**</td>
<td></td>
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</tbody>
</table>

* A fixed amount per field work day – currently R150 per person is typical
Disturbances that enhance and maintain suitable habitat for the target taxon (e.g. Edge et al., 2008)

The Critically Endangered taxa

The Critically Endangered taxa determined during the SABCA project (Mecenero et al., in prep.), plus the CR moth Callioratis millari, are listed in Table 3, with the province of occurrence and the custodians appointed by LepSoc. Three of these taxa occur in Limpopo, one in Mpumalanga, one in KwaZulu-Natal and ten in the Western Cape. Brief notes on each taxon follow; more details can be found in Henning et al. (2009), Mecenero et al. (in prep.) and Staude (2011), as well as the LepSoc website www.lepsoc.org.za.

Table 3 Critically Endangered South African butterflies and moths (Mecenero et al. in prep.; Staude, 2011)

<table>
<thead>
<tr>
<th>CR taxa (*possibly extinct)</th>
<th>Province</th>
<th>Custodian(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaena margaritacea</td>
<td>Limpopo</td>
<td>D McDermott/ A Coetzer</td>
</tr>
<tr>
<td>Anthene crawshayi juanitae*</td>
<td>Limpopo</td>
<td>R F Terblanche</td>
</tr>
<tr>
<td>Callioratis millari</td>
<td>KZN</td>
<td>H S Staude</td>
</tr>
<tr>
<td>Chrysoritis dicksoni</td>
<td>W Cape</td>
<td>R F Terblanche/ D A Edge</td>
</tr>
<tr>
<td>Chrysoritis rileyi</td>
<td>W Cape</td>
<td>R F Terblanche/ H E Selb</td>
</tr>
<tr>
<td>Chrysoritis thysbe schloszae</td>
<td>W Cape</td>
<td>H E Selb</td>
</tr>
<tr>
<td>Dingana fraterna*</td>
<td>Mpumalanga</td>
<td>G A Henning</td>
</tr>
<tr>
<td>Erikssonia edgei*</td>
<td>Limpopo</td>
<td>J C H Dobson/ O G Garvie</td>
</tr>
<tr>
<td>Kedestes barberae bunta</td>
<td>W Cape</td>
<td>A Morton</td>
</tr>
<tr>
<td>Orachrysops niobe</td>
<td>W Cape</td>
<td>D A Edge</td>
</tr>
<tr>
<td>Stygionympha dicksoni*</td>
<td>W Cape</td>
<td>J B Ball</td>
</tr>
<tr>
<td>Thestor brachycerus brachycerus</td>
<td>W Cape</td>
<td>E A Bazin/ D A Edge</td>
</tr>
<tr>
<td>Trimenia malagrida malagrida*</td>
<td>W Cape</td>
<td>A J Claassens</td>
</tr>
<tr>
<td>Trimenia malagrida paarlensis</td>
<td>W Cape</td>
<td>A Morton/ H E Selb</td>
</tr>
<tr>
<td>Trimenia wallengrenii wallengrenii</td>
<td>W Cape</td>
<td>J B Ball</td>
</tr>
</tbody>
</table>

The following brief accounts of the butterfly and moth CR taxa are summarised from Henning et al. (2009) and for C. millari from Staude (2001; 2011).

Alaena margaritacea Eltringham, 1929

This species occurs in a very restricted area near a plantation in the vicinity of Haenertsburg on the Wolkberg, where it flies in December/ January. The habitat is on steep grassy slopes strewn with lichen-covered rocks, on which the females lay their eggs so the larvae can feed on the lichen (Clark & Dickson, 1971). The breeding area is about 400 m below the peaks and adult males do some ‘almost-hilltopping’ near midday when they congregate at the higher rocks above the colony. There are reports of a
second colony in the vicinity and efforts will be made to relocate it, and other suitable habitat, this year. The main threat is that the habitat is becoming overgrown with alien trees escaping from the adjacent pine plantation. *Eucalyptus* species are also established higher up on the hill, and contribute to drying out the natural seepage. Suppression of natural fires by the plantation owners is also detrimental since this type of grassland is fire-dependent. Conservation of this butterfly is therefore critically dependent on securing the co-operation of the landowners. A buffer zone of natural, managed vegetation has to be urgently established around the habitat, with removal of all alien trees. The management plan will also have to incorporate regular burning of the habitat and its surrounds. If other colonies or suitable areas of habitat are found they will also need to be managed and plans made to re-establish connectivity between all the habitat patches.

**Anthene crawshayi juanitae** (Henning & Henning, 1993)

This taxon has only been encountered once, at Manoutsa Park north of the Abel Erasmus Pass in Limpopo, and the type series of one male and five females are the only specimens in existence. The habitat is in riverine forest on the banks of the Olifants River and the vegetation type is Granite Lowveld SV13 (Mucina & Rutherford, 2006). Two of the female specimens were captured while sucking fluid from wet mud, with the other specimens being found as pupae under a rock. The taxon must be viewed as extremely rare since the area has been regularly visited by lepidopterists over a long period. The type locality may be under threat from development of further recreational facilities, and its protection as a butterfly conservation area should receive urgent attention. Identification and search of similar potential sites also needs to be conducted.

**Callioratis millari** (Hampson, 1905)

This species disappeared from its type locality near Kloof, KwaZulu-Natal circa 1928, and was regarded as extinct until rediscovered in the Entumeni Nature Reserve 120km further north in 1997. This remains the only known locality, with an area of occupancy of less than 1km² and a very small adult population (<50). After Staude’s (2001) discovery of the cycad host plant *Stageria eriopus*, early stages and basic habitat requirements, focussed searches of all known likely localities from Mtwavuma Reserve in the south to Ngoye Forest Reserve in the north of KwaZulu-Natal, have so far been unsuccessful (Staude, unpublished reports to KZNWNCS, 1999, 2000, 2001). *C. millari* is restricted at Entumeni to two small patches of Moist Ngongoni Grassland about 500m apart surrounded by forest, cultivated land or unsuitable drier grassland. The species is reasonably well established in only one of these patches. Staude (2001) assessed the conservation status of *C. millari* as Endangered. A population monitoring programme initiated by Ezemvelo KZN Wildlife relies on egg counts (Armstrong & Louw, 2011). The population of the host plant *Stageria eriopus* has been increased by transplanting specimens both at the main habitat patch and in the nearby grassland. Critical habitat management goals are to maintain an appropriate fire regime, prevent excessive grazing and trampling pressure from zebra and other game, and to control alien plants.
Wildlife have a longer term goal to establish the species at other seemingly suitable localities (Armstrong & Louw, 2011).

**Chrysoritis dicksoni** (Gabriel, 1947)

Historically this butterfly occurred between Melkbosstrand and Atlantis on the west coast north of Cape Town (three colonies, now all apparently ‘extinct’*). A large and variable number of small populations, constituting a metapopulation, currently occur over a large area north of Witsand near the mouth of the Brede River. The adult males fly from the end of July until mid September in relatively open sandy areas, settling on low vegetation and establishing small territories. Females are more wide ranging, and lay their eggs on a variety of substrates (Edge & Terblanche, 2010). The vegetation at the Witsand habitat has been identified by Edge & Terblanche (2010) as Canca Limestone Fynbos FF13. Investigation into the life history was done by Clark & Dickson (1971) and Heath & Brinkman (1995). A research programme is currently being conducted as described by Edge & Terblanche (2010) and includes developing counting methods for the adults, accumulating oviposition observations, vegetation surveys at the sites of male and female adult activity, searches for larvae and pupae, and sampling of ants and homopterans at oviposition sites. The immediate threat was perceived to be alien trees *Acacia cyclops* (Rooikrans) on part of the site, and control is being implemented by the landowner.

**Chrysorits rileyi** (Dickson, 1966)

In the 40 years since its description *C. rileyi* has still only been recorded from its type locality near the east side of the Brandvlei Dam southwest of Worcester. The habitat is a few hectares in extent at an altitude of about 300 m on gentle west-facing sandy slopes, with deep erosion channels. The sparse vegetation has been classified as Breede Sand Fynbos FFd8 (Mucina & Rutherford, 2006). Less than 200 adult individuals emerge even in a favourable year and the species was last observed in good numbers in 2005. Adults fly energetically among short bushes and are often seen feeding on mesembryanthemum flowers. The early stages are little known, with the larval food being variously reported as species of *Thesium* (Heath *in* Pringle *et al.*, 1994) or *Aspalathus* (Schlosz *in* Heath, 1997). The associated ant is *Crematogaster peringueyi* (Heath, 1997). Continued property and agricultural developments in the area constitute major threats, and the presence of a quarry in the vicinity has also impacted on the habitat. It is therefore of critical importance to adequately conserve the type locality, which is on private land.

**Chrysoritis thysbe schloszae** (Dickson, 1994)

This butterfly is only known from its type locality (< 1 km²) near Koringberg north of Cape Town, and the surviving population is very small (<50 adults emerging per brood). The habitat is a small remnant of Swartland Shale Renosterveld FRs15 (Mucina & Rutherford, 2006) on a low rocky hill (<450m) surrounded by wheat fields. The
adults mostly emerge in October and March, and whereas the males have a short, low, whirling flight, settling on low vegetation or on the bare ground, the females are rarely seen. Nothing is known of the life history or ecology of this butterfly. The whole region has been severely impacted by increasing aridification, possibly as a result of climate warming. Pesticide use on the surrounding wheat fields has also no doubt taken its toll. Natural fires and grazing no longer occur, leading to an invasion of agricultural cultivars and grass into ever higher levels on the low hill. Conservation measures are urgently needed to prevent imminent extinction and the co-operation of the local farmers is essential. Such measures would include population monitoring, an autecological study to determine the habitat requirements of the taxon, eradication of alien invasive species, and establishment of appropriate fire and grazing regimes.

*Dingana fraterna* (Henning & Henning, 1996)

Also only known from its type locality southwest of the town of Stoffberg, Mpumalanga, at an elevation of 1,600 to 1,700 m. The habitat is situated on the south to southeast-facing slopes of a steep rocky ridge near the base of a deep valley at the eastern escarpment of the highveld plateau. This rocky grassland is interspersed with *Protea* bushes, and the vegetation type is Rand Highveld Grassland Gm11 (Mucina & Rutherford, 2006). Extensive exploration of the Stoffberg area by lepidopterists in recent years has so far not yielded any more localities. Adults only fly early in the morning for about 10 days in early October, with fewer than 10 individuals having been observed each day. Females lay their eggs on an (unknown) grass species. The population appears to be stable from year to year, but potential threats include inappropriate fires and airborne pollutants from mining operations which could degrade the habitat. Ecological research needs to be done on this species to determine the reasons for its restricted distribution before a management plan is established.

*Erikssonia edgei* Gardiner & Terblanche, 2010

This species was only recently recognised and described (Gardiner & Terblanche, 2010), and is only known from its type locality (<1 km²) at the northwestern base of Perdeberg hill near Jan Trichardt’s Pass in the Waterberg mountains of Limpopo (Edge, 1982). The habitat is grassy savanna (Dobson & Garvie, 2005), and the vegetation type is Central Sandy Bushveld SVcb12 (Mucina & Rutherford, 2006). Trees found at the habitat include *Ochna pulchra*, *Burkea africana* and *Protea caffra*. The life history was described by Henning & Henning (1984), and the larval food plant is *Gnidia kraussiana*, with the larvae being tended by ants of the genus *Lepisiota*. Adults have been recorded from November to February. De Wet (1995) conducted research and observed an increase in numbers of adults after introducing a veld-burning programme. In recent years absence of veld-burning or grazing has resulted in the type locality becoming overgrown by a dense sward of tall grass, which has shaded out the larval food plant (Dobson & Garvie, 2005). Consequently the butterfly seems to have become extinct at the type locality, which is on private property. No other localities have yet been found despite exploration by lepidopterists and conservationists in the Marakele
area. No conservation measures are currently in operation, and with the cooperation of the landowner at the type locality veld-burning must be reinstated, in conjunction with intensive searching for other populations.

*Kedestes barberae bunta* Evans 1956

This subspecies is now restricted to two small localities near Strandfontein on the Cape Flats near Cape Town, 8 km north of its type locality near Steenberg where it went extinct (Dickson & Kroon, 1978). The localities are east and west of the junction between the M17 and R310 roads. The habitat consists of stands of the larval host plant *Imperata cylindrica* growing in damp seeps between the dunes. The vegetation type is Cape Flats Dune Strandveld FS6 (Mucina & Rutherford, 2006). An investigation by Allan (2004) showed that the total area of potential habitat at these two localities and in adjacent areas is less than 10 hectares. Adults fly from early September to the middle of October, and are seldom found far from the larval host plant. Threats to the remaining localities are housing developments, road construction, alien vegetation, and too frequent fires. Changing climate, causing greater and earlier drying of the seeps of adequate quality may also be a factor (Henning *et al.* 2009). CapeNature is currently conducting further research to assess its conservation status, but as yet no conservation measures have been implemented. These should include restriction of further development in the area, clearing of alien vegetation at the remaining suitable *Imperata* sites, small mosaic block burns at greater intervals, and selective fencing (Allan, 2004). The five hectares of apparently suitable *Imperata* habitat which falls within reserves, namely the Rondevlei Nature Reserve (a municipal reserve) and the Driftsands Nature Reserve (CapeNature) should be prioritised.

*Orachrysops niobe* (Trimen, 1862)

This species now only occurs at one very small locality (1.4 ha) at Brenton-on-Sea in the southern Cape. The population at Nature’s Valley (about 30 km east of Plettenberg Bay) went extinct in the late 1980s owing to housing development (Ball, 1997). The Brenton-on-Sea locality was proclaimed as a Special Nature Reserve (SNR) in July 2003. It is situated at c. 100 m above mean sea level on a south-facing slope about 500 metres from the sea. The habitat is Knysna Sand Fynbos FFd10 (Mucina & Rutherford, 2006), and the SNR consists of a mosaic of thicket and fynbos, with the larval host plant *Indigofera erecta* usually occurring in the shade of candlewood trees, *Pterocelastrus tricuspidatus* (Edge *et al.*, 2008). Adults emerge in November and February and the later instar larvae feed on the rootstock of the host plant, tended by *Camponotus baynei* ants. Since 2001, the adult population at the SNR has fluctuated between 50 and 250 individuals per brood (Edge, 2005b). All current threats to the species have been identified and mitigated, but there are longer term threats such as the loss of genetic diversity, extreme climatic events, runaway fires, and global warming. The SNR is being managed by a management committee established by the Brenton Blue Trust with representatives from all stakeholders, in accordance with a management plan, which is continuously being refined by research (Edge, 2008). The ongoing research focuses on
continued population and habitat monitoring; determination of ant nest distribution; increasing the *I. erecta* population, and expanding the reserve onto neighbouring properties. Re-introduction of *Orachrysops niobe* to its former habitat at Nature’s Valley is being attempted, without success so far (Edge, 2007).

**Stygionympha dicksoni** (Riley, 1938)

This species was last known to occur on the Kapokberg just south of Darling, in the Swartland of the Western Cape. The type locality was in the gullies on the southern and western flanks of the Tygerberg Hills, east of Cape Town, which was progressively destroyed by housing developments and quarrying. The vegetation at the type locality was Swartland Shale Renosterveld FRs9 (Mucina & Rutherford, 2006), but at the Darling locality it is Swartland Granite Renosterveld FRg2 (Mucina & Rutherford, 2006). More than 70% of the original extent of renosterveld vegetation types has been replaced by agriculture (Cowling & Richardson, 1995). Adults emerge in early September, and favour the higher western and southern slopes of hills (Pringle et al., 1994). There has been a declining population trend over the last 30 years. *Tribolium echinatum* has been recorded as a larval host plant (Dickson in Pringle et al., 1994), but little else is known about its ecology. Habitat degradation and fragmentation due to farming, invasive alien vegetation, housing and mining are the major threats, although a warmer and drier climate may lead to renosterveld being replaced by Succulent Karoo vegetation (Van Wyk & Smith, 2001). If populations can still be found, considerable research is needed on this species, into its life history, ecology and population dynamics. Searches for new localities should also receive high priority.

**Thestor brachycerus brachycerus** (Trimen, 1883)

This taxon has only been recorded from the eastern Knysna Heads. Earlier it was quite widespread, but urban, agricultural and leisure developments have decimated its populations. Two viable populations remain adjacent to the Pezula Golf Estate, and there may still be other small scattered populations elsewhere. The preferred habitat is on north-, northeast- and northwest-facing slopes with low vegetation and open sandy soil (Edge, 2005a), and the vegetation type is Knysna Sand Fynbos FFd10 (Mucina & Rutherford, 2006). Adults fly in December and January, with the males establishing small territories where they perch. Females are wider ranging and oviposit on a range of organic and inorganic substrates, including at least seven different plant species (Bazin & Edge, unpublished observations). The first instar larva was illustrated by Clark & Dickson (1971), and may be aphytopaghous. Many localities have already been destroyed by plantation forestry (earlier years) and ongoing housing, road and golf course development. Further threats are from regular veld-burning and high-intensity sheep grazing across the agricultural parts of its former range. The only conservation measures in place are the undertaking by the owners of Pezula not to disturb the known localities (Edge, 2005a). An intensive research programme has recently been launched by E.A. Bazin and D.A. Edge which will inter alia include:
• Developing counting methods for the adults
• Oviposition behaviour
• Vegetation surveys to compare sites and identify critical site characteristics
• Detailed mapping of the site to establish resource requirements
• Sampling to establish the ant assemblages
• Searching for larvae and pupae in ants’ nests
• Sampling of homopterans at egg sites
• Stable isotope analysis to establish trophic interactions
• Experimental management methods – fire, cutting
• Locating other populations

**Trimenia malagrida malagrida** (Wallengren, 1857)

This subspecies has not been seen at its last known locality on the western side of Lion’s Head in Cape Town since the mid-1990s, and it is feared that it is now extinct (Claassens, 2000). It used to occur at other localities on the Table Mountain Range (e.g. Llandudno). The habitat was on west facing slopes at altitudes of 250 to 350 m, with fairly open rocky ground and short vegetation of the type known as Peninsula Granite Fynbos FFg3 (Mucina & Rutherford, 2006). The adults flew from late January to early April making short jerky flights, settling on the ground, rocks, grasses or other vegetation. Favourite nectar sources were pink-flowered *Mesembryanthemum* species and *Cuscuta* species. Between 20 and 50 adults used to be observed per season in the late 1980s (J.B. Ball, pers. obs.). Little is known of the life history of this butterfly, but the first instar larvae do not appear to feed on plant material, and may be exclusively aphytophagous (Clark & Dickson 1971), with an obligate ant association. The most likely cause of its demise are thought to have been repeated intense mountain fires during the butterfly’s late summer flight period in the mid-1990s (Claassens, 2000). These fires were intensified by the presence of alien vegetation, and the reluctance on the part of the authorities to allow controlled burns before the fuel load got too great. Invasive alien vegetation (*Eucalyptus* trees) also destroyed the locality at the Apostle Batteries above Llandudno. Searches continue however, in the hope of finding another population somewhere along the western side of the Table Mountain range.

**Trimenia malagrida paarlensis** (Dickson, 1967)

This subspecies used to occur on Paarl Mountain, where it now appears to be extinct, but is now only extant at two small localities on the Perdeberg (Paardeberg) some 20 km to the north-west. These localities are high up, each c.0.5 ha and are about 1 km apart, near some rocky outcrops, with some bare ground. Both mountains support the vegetation type Boland Granite Fynbos FFg2 (Mucina & Rutherford, 2006). Adults fly from December to March, with the peak in February and March, a time when the fire hazard is most significant. Probably less than 150 adults emerge every season, based on observations over the past decade. Oviposition has been observed on an *Aspalathus* species (Swanepoel, 1953), although the larvae are probably aphytophagous with an
intimate ant association, as has been noted in another subspecies, *Trimenia malagrida maryae* (Heath & Brinkman, 1996). Severe invasion of alien vegetation and too frequent fires in late summer/autumn probably led to the demise of the Paarl Mountain population. Alien vegetation has not yet become a serious threat on the Paardeberg since is in a nature conservancy (formed by a group of local farmers), but dense alien vegetation forms a ring around the lower part of the Paardeberg mountain, posing an ever-increasing fire risk. The western Paardeberg locality is very overgrown by natural vegetation (and probably needs a localised and carefully timed burn), but the smaller eastern locality is currently not overgrown. The Paardeberg conservancy needs to be persuaded to clear all alien vegetation and to institute an appropriate regime of mosaic burning. Ongoing monitoring and research into the life history and ecological interactions of this taxon are urgently needed.

**Trimenia wallengrenii wallengrenii** (Trimen, 1887)

The last two known localities for this taxon are on privately owned farms on the Kapokberg and the Contreberg near Darling in the Western Cape. Both localities are about 700 m² in extent each, and occur on the southwestern side towards the summit of the mountains. Historically there were populations near Stellenbosch and north of Mamre. The vegetation at the extant localities is Swartland Granite Renosterveld FRg2 (Mucina & Rutherford 2006), and like most renosterveld vegetation is threatened (Cowling & Richardson 1995), principally by urban development and wheat farming. Places where it has survived are situated on rough, rocky or steep ground which have escaped the plough. The adult butterflies emerge in November and fly low and fast in open areas. The Kapokberg locality does not exceed 50 adults per flying season, whereas at the Contreberg site there were 100 adults in November 2003 (J.B. Ball, pers. obs.). The life history is unknown, but the larvae are probably aphytophagous, with an obligate ant association. The past and present threats are habitat destruction and degradation from agricultural activity and invasive alien vegetation, with cultivated areas sometimes extending up to the borders of the existing colonies. Fires can also be devastating when the adult butterflies are on the wing. Habitat fragmentation is already severe at the Darling sites and may worsen in the near future if no conservation action is taken. Cooperation of the landowners is crucial, not only to secure the known localities, but also to create corridors for movement of adults between the sites. Ongoing monitoring of populations and research into the life history and ecological interactions of this taxon are essential to inform conservation efforts.

**Conclusions**

Many of the South African butterflies listed as Critically Endangered in the new Southern African Butterfly Atlas are very close to extinction, or may already have gone extinct. The COREL programme is a response to this desperate situation and a call for immediate action by all persons and organisations dedicated to biodiversity conservation. It is also an appeal to both institutional
and corporate funders to support this programme by making resources and funding available to prevent the tragic loss of these beautiful and charismatic emblems of our country’s amazing natural riches.

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