

## Final Evaluation Report

---

Your Details	
<b>Full Name</b>	Dr Dhaneesh Bhaskar
<b>Project Title</b>	Role of Crested Pygmy Grasshoppers in Evergreen Forest Ecosystems: Ecology and Conservation
<b>Application ID</b>	35063-1
<b>Date of this Report</b>	30/12/2022

**1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Survey for <i>Deltonotus</i> in the evergreen forest of Nilgiri Biosphere Reserve, India.				<p>The evergreen forest of two states, Kerala and Tamil Nadu (Wayanad Wildlife Sanctuary, Aralam Wildlife Sanctuary, Silent Valley National Park, Mukurthi National Park Sathyamangalam Tiger Reserve and Mudumalai Tiger Reserve) were surveyed for the <i>Deltonotus</i> populations.</p> <p>*We failed to cover the Karnataka part as their forest department refused to issue the permit sanction. Since the project was scheduled for only one, there was only a limited time available to convince the department. While applying for the grant, we had research permits for the Kerala and Tamil Nadu part of NBR.</p>
Distribution status of <i>Deltonotus</i> in Nilgiri Biosphere Reserve, India.				<p>The <i>Deltonotus</i> grasshoppers in India are known only from Parambikulam Tiger Reserve and Eravikulam National Park, Kerala (Bhaskar et al. 2020). The highest known elevational range for the <i>Deltonotus</i> sp. in India was 1500 m asl. We have updated the elevational range with this project as 2300 m asl from Mukurthy National Park, Tamil Nadu, Nilgiri Biosphere Reserve. The lowest known elevational range for the species in India is 400 m asl. Both the species <i>D. subcucullatus</i> and <i>D. gibbiceps</i> are syntopically occupying the evergreen forest floors across the surveyed NBR regions.</p> <p>A global distribution Map for <i>Deltonotus</i> species is prepared.</p>
Conservation status assessment for <i>Deltonotus gibbiceps</i> and <i>Deltonotus subcucullatus</i> .				<p>Conservation status assessment for both the <i>Deltonotus</i> species was completed. (The assessment draft report is submitted to the IUCN SIS</p>

		<p>portal, Dr B. Odé assigned as a reviewer).</p> <p>The conservation status (Draft):  <i>Deltonotus gibbiceps</i>      = Endangered B2ab(v)</p> <p>Justification: The <i>Deltonotus gibbiceps</i> is an endemic grasshopper's species to the Western Ghats and Sri Lanka biodiversity hotspot (Bhaskar et al. 2020). They are found to be specific to evergreen forest floors, and the habitats in the known six locations are severely fragmented. The number of mature individuals in different populations is also severely fluctuating. Also, the species faces threats from invasive climbers in the Western Ghats. Hence with a known area of occupancy of 72 km<sup>2</sup> and identified fragmented habitats, the conservation status of <i>Deltonotus gibbiceps</i> is assessed as Endangered (EN) under criterion B2ab (v).</p> <p><i>Deltonotus subcullatus</i> =      Endangered B2ab(v)</p> <p>Justification: The <i>Deltonotus subcucullatus</i> is an endemic flightless, cryptic, crested grasshopper's species found in isolated, fragmented evergreen forest patches of the Western Ghats and Sri Lanka biodiversity hotspot (Bhaskar et al. 2020). The number of mature individuals in different populations of <i>Deltonotus subcucullatus</i> is also severely fluctuating. They face threats from invasive climbers in the Western Ghats. Hence with a known area of occupancy of 88 km<sup>2</sup> and identified fragmented habitats, the conservation status of <i>Deltonotus subcucullatus</i> is assessed as Endangered (EN) under criterion B2ab (v).</p>
<p>Identifying the threats and conservation challenges in <i>Deltonotus</i> habitat</p>		<p>Apart from some preliminary observations, the threats and conservation challenges faced by <i>Deltonotus</i> remain poorly understood. The primary threat to the <i>Deltonotus</i> species are their fragmented habitats</p>

			and isolated population (Bhaskar et al. 2020). There is only a little known about their ecology and threats to this species. As they prefer moist leaf litter beds, logging and wood harvesting in non-protected evergreen patches are a severe threat. During the RedList survey in Nilgiri Biosphere Reserve, the invasion of climbers such as <i>Mikania micrantha</i> in evergreen forest floors of the Western Ghats is identified as an immediate threat to <i>Deltonotus</i> .
Abiotic tolerance and Biotic interactions of <i>Deltonotus</i> .			We tried several methods to reach this goal; however, we failed to understand the abiotic and biotic interactions on a deeper scale. More time must be spent in the field to understand the abiotic and biotic interactions of <i>Deltonotus</i> .
Grasshopper conservation workshops, training and awareness programmes to students, researchers and protected area managers			Grasshopper conservation workshops, training and awareness programme was conducted for frontline conservation leaders of Kerala and Tamil Nadu. A #HOPE (grassHOPpEr) campaign was initiated in Nilgiri Biosphere Reserve, highlighting <i>Deltonotus</i> as a key indicator species to the evergreen forest conditions. As part of the awareness campaign, <i>Deltonotus</i> printed t-shirts and stickers were distributed to various levels. Field staff of Thalavdy, Jeerahally, Hasanur and Geermalam forest ranges in Sathyamangalam Tiger Reserve participated in the awareness workshop conducted at Geermalam Range Sathyamangalam Tiger Reserve. Wayanad Wildlife Sanctuary Field staff were also engaged in the awareness workshop conducted at Tholpetty range Wayanad Wildlife Sanctuary. Several awareness sessions were conducted for researchers in various research institutions in Kerala, including the College of Forestry Kerala Agricultural University, Department of Zoology Payyannur College, Govt Higher Secondary schools in

			Manathavady, Thavinjal and Padinharathara.
Conservation recommendations for protected area managers			As we identified the invasive plant dominance in canopy-opened floors of evergreen forests as a significant threat to the species, proper weed management is recommended during the awareness campaign. Logging and wood harvesting is a major threat disturbing the virgin forest floor harmony. Since the <i>Deltonotus</i> are very specific to their evergreen microhabitat conditions undisturbed status of the evergreen forest floors should be maintained. A detailed report will be submitted to the head of forests of both states.
Publications on the distribution, ecology and conservation of <i>Deltonotus</i>			Publications on the distribution and ecology of <i>Deltonotus</i> are under preparation.

**2. Describe the three most important outcomes of your project.**

- a). Conservation status assessment of *Deltonotus* species in India.
- b). New distribution records.
- c). An awareness campaign for grasshopper conservation is initiated, with *Deltonotus* as key species.

**3. Explain any unforeseen difficulties that arose during the project and how these were tackled.**

We failed to rear them in lab conditions; the microhabitat preferences of *Deltonotus* and their biotic and abiotic interactions need to be studied in detail. There were limitations in observing their nocturnal or crepuscular activities, all the identified *Deltonotus* habitats were inside protected areas; hence there were restrictions for night surveys.

**4. Describe the involvement of local communities and how they have benefited from the project.**

The frontline field staffs in Nilgiri Biosphere Reserve are from local tribal communities. The strange fact we came across was that even the traditional tribal communities were unaware that there was such a unique grasshopper species inhabiting their forest floor. We educated them about the role of *Deltonotus* in their forests.

**5. Are there any plans to continue this work?**

Yes! We look forward to continuing to understand the rare grasshoppers in detail. As we have encountered some adverse results in specific areas, such as abiotic and biotic interactions and lab experiments, we would like to develop more sophisticated techniques with advanced lab and experimental facilities.

**6. How do you plan to share the results of your work with others?**

We have already communicated to the trainees about whatever the little we understood on the *Deltonotus*. With the conservation status assessment and other ecological information, a manuscript on the ecology of *Deltonotus* is under preparation.

**7. Looking ahead, what do you feel are the important next steps?**

We look forward to continuing working on grasshoppers, especially on rare, unique species such as *Deltonotus*. So far, the species are only known from evergreen forests of the Western Ghats and Sri Lanka as an essential next step we wish to survey more evergreen habitat conditions in the entire country. We have also communicated with researchers and conservation leaders in Sri Lanka (no one is actively working on grasshoppers in Sri Lanka) and planning to spread the research and conservation activities with more international collaborations.

**8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?**

Yes! We have used the Rufford logo in every communication that we generated for this project. The logo designed for the awareness campaign #HOPE had The Rufford Foundation logo as a significant supporter.

**9. Provide a full list of all the members of your team and their role in the project.**

**Dr Dhaneesh Bhaskar** – Principal Investigator

**Dr P S Easa** – Mentor

**Dr Jayshree Venkatesan** – Mentor

**Mrs Arunima C Rajan** – Team member

**Mr Subin** – Technical Support





# GrassHOPpERS



**10. Any other comments?**

I wish to express sincere gratitude to The Rufford foundation for the support. It was not easy to find money for working on a neglected group of invertebrates, especially in a country where the idea of biodiversity conservation is restricted to larger charismatic species. For the first time in India, we have assessed the conservation status of grasshopper species and red-listed them. We admit the fact that we failed to achieve one objective which is about studying the biotic and abiotic interactions of the grasshopper in their evergreen forest habitats which we will achieve in future projects. With the Rufford small grants we have initiated a project on an extremely rare endemic grasshopper species. We look forward to continuing to work on the same.





IUCN Species Information Service (SIS) Toolkit  
Assessment Report

<b>Taxonomy</b>				
<b>Kingdom</b>	<b>Phylum</b>	<b>Class</b>	<b>Order</b>	<b>Family</b>
ANIMALIA	ARTHROPODA	INSECTA	ORTHOPTERA	TETRIGIDAE
<b>Scientific Name:</b>	Deltonotus gibbiceps			
<b>Species Authority:</b>	(Bolívar, 1902)			
<b>Common Name/s:</b>	-			
<b>Synonym/s:</b>	Deltonotus humilis Hebard, 1930 Epitettix tamilus Günther, 1939 Poecilotettix gibbiceps Bolívar, 1902 Potua aptera Wagan & Kevan, 1992			
<b>Taxonomic Notes:</b>	-			
<b>Assessment Information</b>				
<b>Red List Category &amp; Criteria:</b>	Endangered B2ab(v)			
<b>Year Assessed:</b>	2022			
<b>Assessor/s:</b>	Bhaskar, D. & Hochkirch, A.			
<b>Reviewer/s:</b>	Odé, B.			
<b>Contributor/s:</b>				
<b>Facilitator/s:</b>				
<b>Institutions/s:</b>	IUCN SSC Grasshopper Specialist Group			
<b>Justification:</b>	<p>The <i>Deltonotus gibbiceps</i> is an endemic grasshoppers species to the Western Ghats and Sri Lanka biodiversity hotspot (Bhaskar et al 2020). They are found to be specific to evergreen forest floors and the habitats in the known six locations are severely fragmented. The number of mature individuals in different populations are also severely fluctuating. Also, the species faces threats from invasive climbers in the Western Ghats. Hence with a known area of occupancy of 72 km<sup>2</sup> and identified fragmented habitats the conservation status of <i>Deltonotus gibbiceps</i> is assessed as Endangered (EN) under criterion B2ab (v).</p>			
<b>History:</b>	-			
<b>Geographic Range</b>				
<b>Range Description:</b>	<p><i>Deltonotus gibbiceps</i> is small cryptic pygmy grasshopper species endemic to the Western Ghats and Sri Lanka Biodiversity hotspots (Bhaskar et al 2020). The species has a very restricted distribution in evergreen forested areas in the Western Ghats and Sri Lanka. The lowest elevation was reported from Sri Lanka as 64m asl (recent survey by local volunteers) and the highest elevation from Eravikulam</p>			

	National Park, India as 2200m asl (Bhaskar et al 2020). The extent of occurrence (EOO) is estimated as 16025 km <sup>2</sup> and the area of occupancy (AOO) as 72 km <sup>2</sup> .
<b>Countries:</b>	<b>Native:</b> India; Sri Lanka;
<b>Population</b>	
<b>Population:</b>	The unique habitat specificity of <i>Deltonotus gibbiceps</i> restricted their populations to isolated evergreen patches in the Western Ghats and Sri Lanka biodiversity hotspots. No data is available on the species' population size or trend. Bhaskar et al (2020) documented highly fragmented populations of <i>Deltonotus gibbiceps</i> in the Western Ghats, Kerala and Tamil Nadu parts. During a recent study, the number of mature individuals in the Western Ghats is observed to be extremely fluctuating (SSC Grasshopper Specialist Group). The populations of <i>Deltonotus gibbiceps</i> has been under monitoring since 2018 (Bhaskar et al 2019) since then the number of mature individuals in populations found to decreasing irrespective of seasons.
<b>Population Trend:</b>	Decreasing
<b>Habitat and Ecology</b>	
<b>Habitat and Ecology:</b>	The habitats and ecology of <i>Deltonotus gibbiceps</i> need to be better documented; they are observed to be specific to tropical evergreen moist leaf litter habitats. Study ongoing on the role and significance of <i>Deltonotus</i> in the evergreen forests in the Western Ghats.
<b>List of Habitats:</b>	1 Forest 1.6 Forest - Subtropical/Tropical Moist Lowland 1.9 Forest - Subtropical/Tropical Moist Montane
<b>Threats</b>	
<b>Major Threat(s):</b>	Fragmented habitat is a significant identified threat to <i>Deltonotus gibbiceps</i> (Bhaskar et al 2020). As the ecology of the species is not well known, the threats to this species still need to be clarified. Logging and wood harvesting in evergreen habitats outside protected areas is a potential threat to the habitat loss of this species. Invasive species such as <i>Mikania micrantha</i> are found to be occupying the forest floors in the Western Ghats, which may overrun the habitats of <i>Deltonotus</i> .
<b>List of Threats:</b>	5 Biological resource use 5.3 Logging & wood harvesting 5.3.3 Unintentional effects: (subsistence/small scale) [harvest]
<b>Conservation Actions</b>	

<b>Conservation Actions:</b>	With the support of the Rufford foundation small grants, the SSC Grasshopper Specialist Group is studying the role and significance of Deltonotus in the evergreen forests of the Western Ghats along with conservation and awareness programme.
<b>List of Conservation Actions:</b>	1 Land/water protection 1.1 Site/area protection 2 Land/water management 2.2 Invasive/problematic species control 2.3 Habitat & natural process restoration

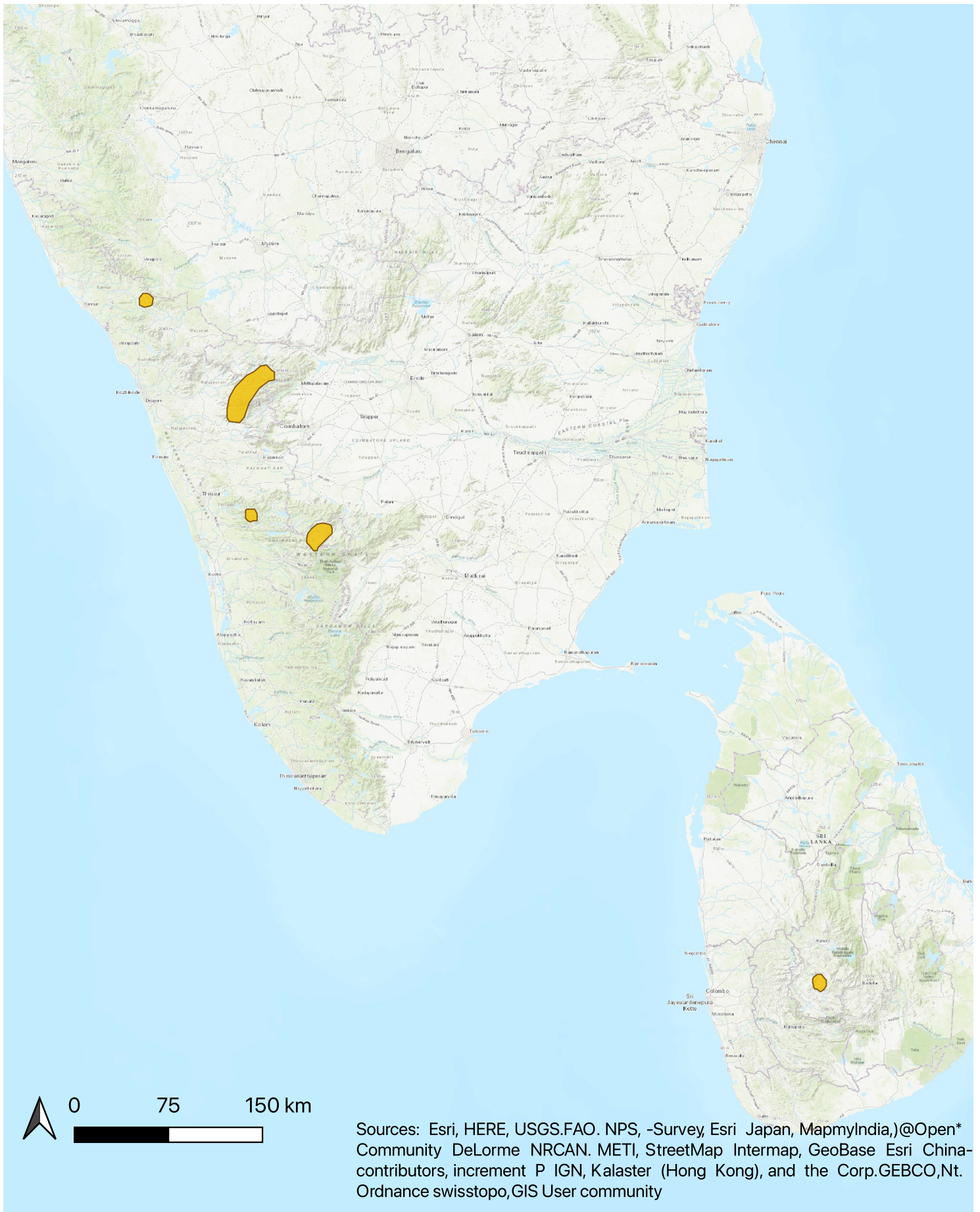
### Bibliography

	<p>Bhaskar, D., Easa, P.S., Sreejith, K.A., Skejo, J &amp; Hochkirch, A. 2019. Large scale burning for a threatened ungulate in a biodiversity hotspot is detrimental for grasshoppers (Orthoptera: Caelifera). <i>Biodiversity and Conservation</i> 28: 3221-3237.</p> <p>Bhaskar; Stermšek; Easa; Franjević &amp; Skejo. 2020.. Wide-nosed pygmy grasshoppers (Cladonotinae: Cladonotini, Xerophyllini) of India and Sri Lanka: catalogue with an identification key and description of a new species of the genus Tettilobus. <i>Zootaxa</i>. 4894(3): :474–500.</p> <p>Bolívar, I. 1902[1901]. . Les Orthoptères de St. Joseph's College, à Trichinopoly (Sud de l'Inde). 3me partie. . <i>Annales de la Société Entomologique de France</i>. 70:: 580-635, pl. 9.</p>
--	--


**Citation:** -

# Distribution Map

## *Deltonotus gibbiceps*



### Range

 Extant (resident)

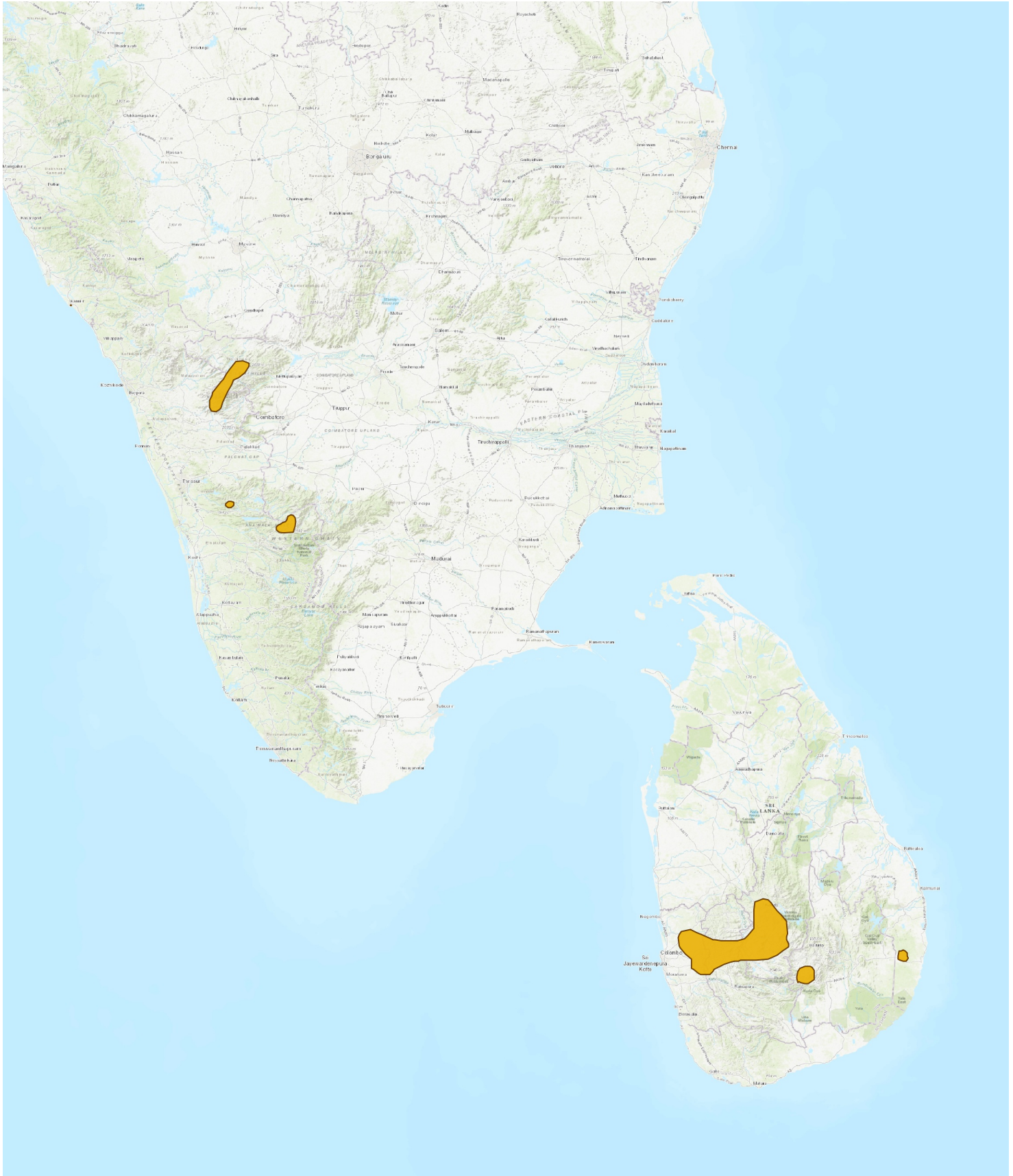
### Compiled by:

Dhaneesh Bhaskar, SSC Grasshopper Specialist Group




# Distribution Map

## *Deltonotus subcucullatus*



Sources: Esri, HERE, USGS.FAO. NPS, -Survey, Esri Japan, MapmyIndia,)@Open\* Community DeLorme NRCAN. METI, StreetMap Intermap, GeoBase Esri China-contributors, increment P IGN, Kalaster (Hong Kong), and the Corp.GEBCO,Nt. Ordnance swissstopo, GIS User community

### Range

 Extant (resident)

### Compiled by:

Dhaneesh Bhaskar, SSC Grasshopper Specialist Group