



Danube Clouded Yellow (*Colias myrmidone*) Survey in Belarus
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Report compiled by Mike Williams

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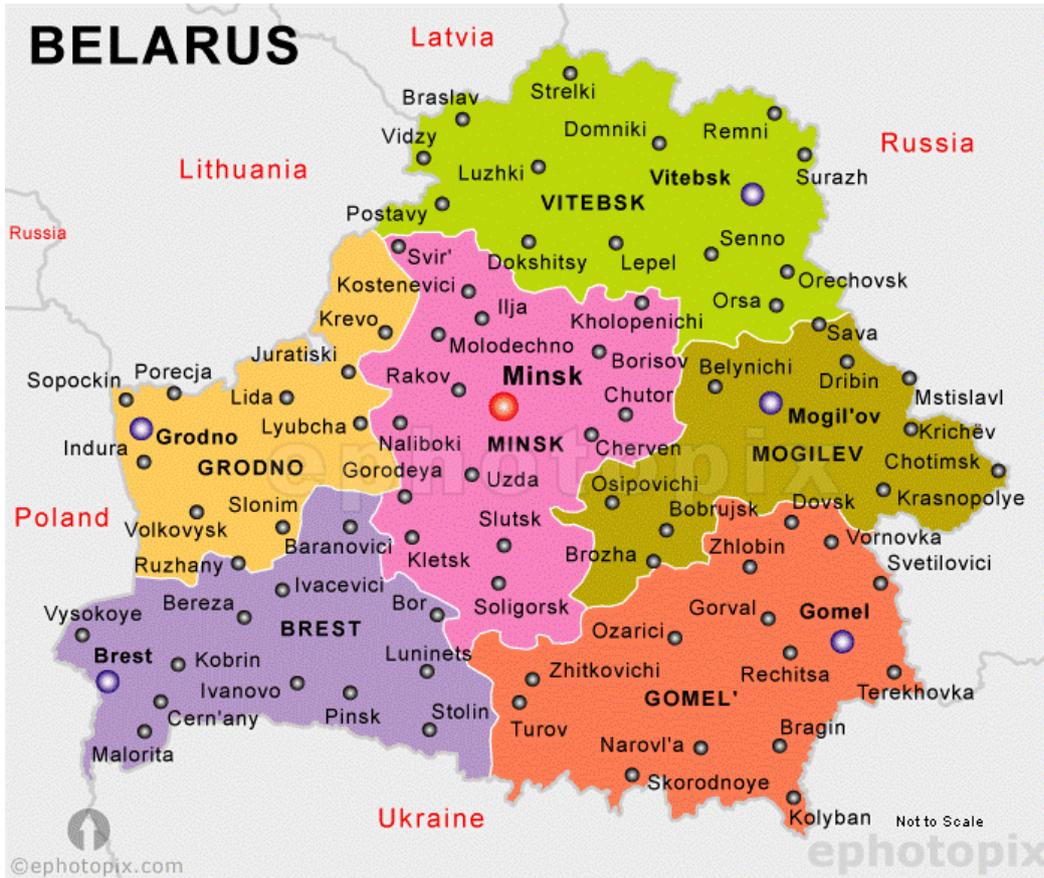
Background

The Danube Clouded Yellow *Colias myrmidone* once occurred across a number of countries in eastern and central Europe but has now disappeared completely from much of its former range. The only known current or recent records in Europe come from a few sites in Poland, a few local areas in Slovakia, with the only known significant populations remaining in Europe now being in two areas of Romania which have been the subject of study by Butterfly Conservation's European Butterfly Group since 2015 (see 'Searching for the Danube Clouded Yellow in Romania in 2015' Davies, M; Prentice, M; Spencer, S; and Tolhurst, K). However, even in Romania its range has contracted, with it having apparently recently disappeared even from some sites where it had been seen in the last 10 years.

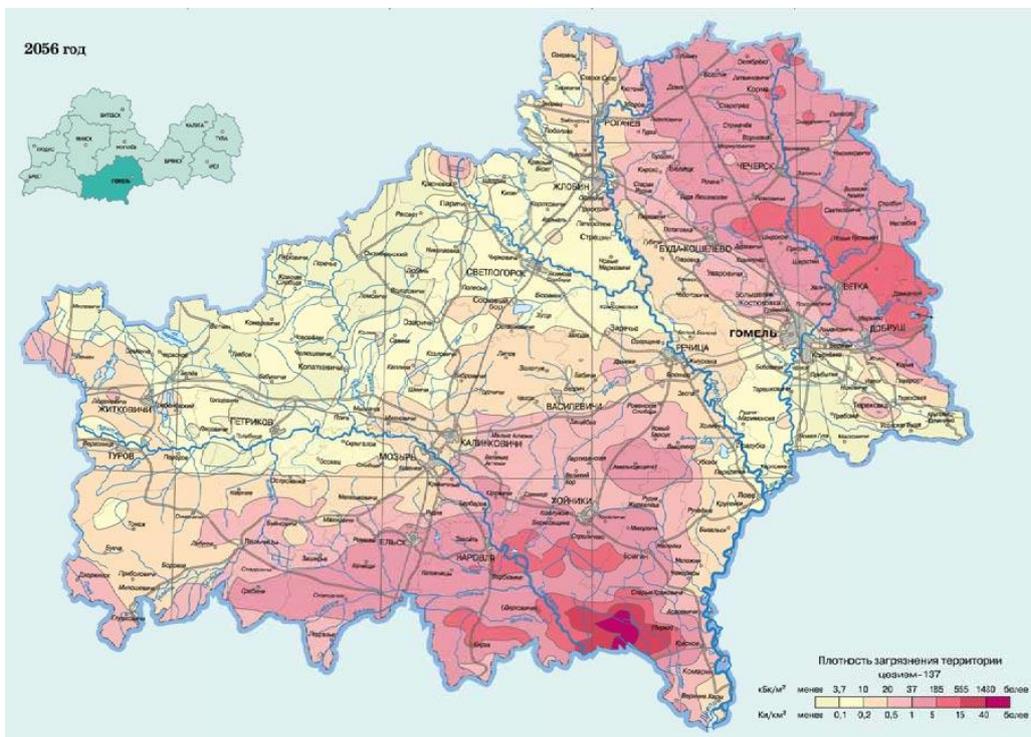
The stimulus for this present study stemmed from a private tour organised by Mike Williams in 2016 which recorded 2 Danube Clouded Yellows at a site around 60 miles south-east of Turov on 17th June. The habitat looked very suitable to support a larger population of the species but the condition of the two specimens found and the fact that they were both female suggested we were right at the end of the first flight period. According to Anatoli Kulak, a Belarussian entomologist who accompanied this earlier visit, other locations for the species occurred in south-east Belarus. It was determined to organise a return visit to Belarus with a small survey team to undertake a more focused survey to coincide with a time when second generation adults were likely to be on the wing. A team of experienced volunteers from the West Midlands were subsequently recruited and arrangements were made to return to Belarus from 6-13th August, 2018. Transport and hotel accommodation were arranged through Ecotours, a Hungarian based tour operator who run mainly bird tours to Belarus and who had also assisted with arrangements for the 2016 visit. The group were based in a hotel in a small village just north of the town of Rechitsa in south-east Belarus and were again accompanied by Anatoli Kulak from the Zoology Department at Minsk University. We were also joined for our fieldwork by Vladimir, an Area Forester employed by the Belarus Forestry Department, who acted as our local guide. The trip was largely self-funded by those taking part with a contribution towards transport and accommodation costs also made by the European Butterflies Group.

Survey Methods

The team spent four days in the field visiting locations in the Gomel (sometimes spelled Homel) region of south-east Belarus. The location of each site visited was recorded using GPS and a photographic record was taken. The absence/presence of *C. myrmidone* was noted at each site (including gender where possible), an assessment of the abundance of the larval foodplant (in Belarus *Chamaecytisus ruthenicus* appears to be the main species of Broom utilised) in each location was made and, where present, searches were made for the presence of ova and larvae. Any observations regarding butterfly behaviour and habitat preferences were also noted. Records were also kept of any other species of butterfly and moth observed.



Map showing location of the Gomel region of Belarus in the south-east of the country not far from the Ukrainian border



More detailed of the map of the Gomel region showing some of the main roads, towns and villages

Results

During the course of four days, fifteen main sites were visited over a wide area and *C. myrmidone* recorded at more than half of these. The sites where the butterfly was recorded in any of its life stages are described below.

Day 1 – 7th August, 2018

Site 1



Forest clearing close to track

Excellent start to the survey with discovery of a previously unknown location for *C. myrmidone* close to our hotel. A recently cleared area contained many Broom plants growing in sandy soils.





The Broom was identified as *Chamaecytisus ruthenicus* (sometimes described as Russian Broom), a low growing deciduous shrub with a fairly local distribution in central Europe. The main flowering period is May-June and the plant is found on heathy areas and other dry open habitats. A search of around 20 minutes found almost 40 eggs of *C. myrmidone*. In nearly all cases, they were laid near the tips of the foodplant on fresh (current year) growth.



Eggs were mainly laid singly on the uppermost surface of the leaves but it was not unusual to find several eggs nearby on the same plant. Only 3 adults were seen – 1 definite female which was photographed (see photo on front cover) and 2 probable females in flight. It appeared from the relatively large number of eggs found and the few adult sightings that the main flight season for *C. myrmidone* in Belarus was drawing to an end. This was a little disappointing as it meant we were not able to estimate the numbers of adults at any individual sites but had the advantage that we were able to identify breeding areas, gather information on the utilisation of the larval hostplant for egg-laying and ascertain particular habitat preferences.

Site 2

Our next location was a site alongside the River Dnieper.



Here a small sandy bank above the river contained extensive areas of foodplant.



Around 5 adults (again all probable females) were seen flying in this area and an open area immediately above the bank and a small number of eggs were found. One of the butterflies was captured and proved to be the female form alba. This form had also been recorded on our 2016 visit and appears to be relatively common in Belarus although females of the normal form were also regularly encountered.



C. myrmidone f. *alba*

Other butterflies recorded at this location included *Boloria selene* Small Pearl-bordered Fritillary, *Boloria dia* Weaver's Fritillary, *Araschnia levana* Map, *Argynnis paphia* Silver-washed Fritillary, *Issoria lathonia* Queen of Spain and *Hyponophele lycaon* Dusky Meadow Brown

Site 3

A roadside verge spotted on our return journey proved very productive. This again was a previously unknown site with plentiful *C. ruthenicus*.



11 eggs were recorded here in approximately 10 minutes and a female *C. myrmidone f. alba* was seen.

Day 2 – 8th August, 2018

Site 4

Having stayed fairly local to our hotel on the first day, the following day we drove around 100km south to visit a different area of forest close to the Ukraine border. We learned that a number of forests in Belarus had been infected by a bark beetle which had resulted in areas of trees being clear-felled, followed in some cases by burning as a control measure.



We found that this work had inadvertently created new opportunities for *C. myrmidone* and, although the foodplant was not yet as abundant as the previous day, we found a further 7 eggs both along track edges and within the newly created clearings. Even fairly isolated plants had attracted egg laying but no adults were seen.



Our local guide Vladimir, while we enjoyed a picnic lunch, busied himself collecting Ceps from the forest which were very plentiful.



Much of the forest we visited was very even-aged and the ravages of bark beetle offered the chance perhaps to move towards more uneven-aged forest leaving areas to naturally regenerate rather than immediately be replanted which would mean conditions possibly remaining suitable for *C. myrmidone* over a longer period. Other species of butterfly recorded included *Argynnis adippe* High Brown Fritillary, *Gonepteryx rhamni* Brimstone, *Lassiommata maera* Large Wall Brown, *Lycaena tityrus* Sooty Copper and again *Argynnis paphia* (including f. *valezina*). We also on leaving the site recorded a single *Colias hyale* Pale Clouded Yellow; the only other *Colias* sp seen during our stay.

Day 3 – 9th August, 2018

Site 5

Another fairly long journey today in order to target forest south-east of Rechitsa including areas managed by Vladimir. This first site was a known location for *C. myrmidone* with records as recent as 2015.



In reality, the site proved disappointing, quite overgrown and shaded out with no life stages of *C. myrmidone* recorded. A reasonable amount of Broom was still growing but close to the base of oak trees which cast considerable shade. Previous records appeared to be first generation and it may be that the site is less shady earlier in the year but it could also be that the species has been recently lost to this site altogether. Apparently, the site is known to collectors which may be a factor but habitat deterioration seemed a more likely cause. Given the continued presence of the foodplant, restoration of suitable conditions would still be achievable but only through the removal of several of the oaks, something which may not be popular with local people as the area is renowned for its mushrooms! Something of a surprise given the habitat (generally dry and arid) we recorded nearby *Lycaena coridon* Chalkhill Blue.

Site 6

Much more encouraging was this clearing spotted as we drove in and visited on our return journey. Broom was abundant here especially in the tyre tracks left by extraction vehicles. Compaction of the bare ground by tracked vehicles had encouraged considerable quantities of the foodplant.



Eggs were plentiful and it was very interesting to watch a female *C. myrmidone f. alba* egg laying. The process of egg laying was extremely quick with several eggs being deposited on the same plant in rapid succession followed by a swift visit to a yellow compositae flower for the purpose of imbibing nectar or resting for a few seconds on a leaf or on bare sand.



Time did not allow a thorough egg search of the area but a quick search close to the track produced 8 eggs and we must have seen at least this number being laid by the female before losing her to sight. The abundance of foodplant and general suitability of the habitat, however, would suggest dozens if not hundreds of eggs. The challenge in terms of conserving the butterfly is to find ways of either maintaining the suitability of these clearings or creating new areas sufficiently close by to colonise once the original clearing becomes unsuitable.

A second normal form female was also captured in the same area.



Site 7

This problem of succession was well illustrated by the next site visited. This was an area which had been clear-felled 3 years earlier and had not been replanted. The result had been considerable regrowth of scrub and young trees and, while Broom was still present, it was being out-competed by other vegetation and no eggs were found.



A butterfly present that had not been previously recorded was *Lycaena virgaureae* Scarce Copper.

Site 8

This nearby site had also been recently clear-felled but a belt of trees had been left adjoining the track which cast considerable shadow over the clearing.



Little foodplant was present but eventually one empty eggshell was found on a more exposed plant. A number of translucent, hatched out eggs have been seen over the past days so clearly the egg is not always eaten by the emerging caterpillar.

Day 4 – 10th August, 2018

Site 9

For our final day of fieldwork it was decided to explore forests west of Rechitsa. This was new territory with no previous records of *C. myrmidone* and no knowledge regarding access. From the main road we took a turning to the small village of Novokrasnoje where a flowery meadow produced *Cupido argiades* Short-tailed Blue, *Lycaena dispar* Large Copper and *Plebejus argus* Silver-studded Blue amongst a number of species we had previously recorded. From the village, we took a sandy track into the adjoining forest. Initially this did not look too promising and we were about to turn back when a female *C. myrmidone* was seen flying towards us. Nearby we discovered a rather isolated but sizeable patch of Broom on the track edge and started to search for eggs.



A search of this small patch produced no fewer than 26 eggs. The eggs were at varying stages of development suggesting a number of females had been involved and we were able to compare eggs in some detail. Newly laid eggs are white, soon turning orange (below) and then darkening prior to hatching.



What this find clearly demonstrated was the ability of female *C. myrmidone* to locate plants suitable for egg-laying even when they are very isolated (up to this point on our walk we had seen no larval foodplants) and also the importance of forest tracks as corridors of dispersal through the landscape.

Careful searching of the Broom plants led to the discovery of a newly hatched larva which interestingly in the light of previous observations was eating its eggshell.



Another interesting discovery was a nearby wayleave where again we found eggs. Conditions were ideal with clumps of low-growing Broom in sunny positions and not swamped by surrounding vegetation. Plants up to around 1 metre tall were favoured and altogether we found almost 40 eggs. Beyond this height, few eggs were found suggesting that plants are then over-mature and presumably less nutritious to the larvae.





We watched one female which laid 8 eggs on a single plant in around 30 seconds without hesitation. Quite a contrast to many other species of Lepidoptera. As before, egg-laying was interspersed by equally quick visits to flowers. Rather like the clearings created because of infestations of bark beetle seen on Day 2, the control of vegetation below the overhead power lines had inadvertently created good *C. myrmidone* habitat as well as providing another corridor of dispersal.

Site 10

To test out our theory regarding the possible importance of wayleaves, the sighting of another wayleave (in reality an extension of the first) prompted us to stop for further exploration.



This proved equally productive with over 30 eggs found on low growing Broom along a long stretch of wayleave. At least 3 female *C. myrmidone* were present (2 normal form, 1 f. alba) together with our only confirmed sighting of a male during the entire survey.



Male *Colias myrmidone* Danube Clouded Yellow

We were also pleased to locate a second larva a little larger than our previous find but still probably in its first instar.



A good note to finish on and worthy of a celebration back at our hotel.



Survey team (l-r): Liz Lloyd, Mike Williams, Vladimir, Gabor Orban, Anatoli Kulak, Martyn Davies, Mel Mason

Conclusions

From our fieldwork, it appears that *Colias myrmidone* Danube Clouded Yellow is widespread within the well-wooded landscape of south-eastern Belarus. It would appear to exist as a large metapopulation flying through the landscape and laying eggs where suitable areas of habitat are found. A situation helped by the fact that forests in this part of Belarus are well connected (see Appendix 1) and are still actively managed. The light sandy soils which occur are very suited to Broom and the larval foodplant was extremely common in areas of disturbed soils along track edges and in forest clearings where *Chamaecytisus ruthenicus* flourished in the bare soils. Low growing plants less than 1 metre tall growing in open sunny conditions and not swamped by surrounding vegetation were favoured for egg laying. Eggs were laid singly and at some speed although several eggs could sometimes be found on the same plant.

The timing of our visit was aimed at maximising opportunities to observe adult butterflies during their second generation which with *C. myrmidone* is generally regarded as being more numerous than the first. In reality, peak flight season was past and relatively few adults were seen. While this meant that it was not possible to assess population densities and some aspects of behaviour (e.g. courtship and mating), it did mean that we were in a good position to focus on determining habitat preferences on the part of females and identify aspects of egg-laying behaviour.

As indicated above, we were unable to spend much time studying the behavior of individuals because of time spent searching for eggs (something we became expert at very quickly) but mainly through the lack of adult sightings. However, those females who were observed from time to time flying across areas of habitat to stop and lay eggs suggested that they were extremely mobile. Females were seen repeatedly flying close to or over larval foodplants before choosing individual plants to lay their eggs. What would be worth further study would be to ascertain how faithful females were to one area of forest and, if so, the larger the cleared area and thus the number of larval foodplants the better, or whether the female is more mobile than this and thus the greater the number of smaller cleared areas close to each other would be preferable producing a mosaic of suitable habitats. More knowledge of mobility would be extremely useful in this context as areas of suitable habitat may currently be separated by large tracts of forest plantation and therefore not within reach.

An important discovery was the use of both forest tracks and wayleaves for dispersal and egg-laying. The wayleaves we investigated were one of the few sites where we saw more than one adult, and indeed the only location where we recorded a definite male. Such areas provided a reasonable density of larval foodplants and, as long as the area was maintained, allowing access for foresters and engineers, they would continue to provide good habitat for *C. myrmidone*. However, if left unattended the wayleaves would eventually revert to scrub and degrade in quality. Wayleaves also provided a wide corridor along which the butterflies could move in an uninterrupted manner over a large area allowing them to find mates more easily and suitable larval foodplants. Because of its considerable width, the aspect of the wayleave was probably not so important but, if it were possible, some forest tracks would benefit by being widened, although for economic reasons this may not be an option, and aspect may be more of a consideration here. Even scalloped areas cut into the forest would help if it encouraged larval foodplant and nectar sources to grow. It is worth noting that some of the clear-felled areas that were so beneficial for the growth of larval foodplant could be reforested very soon and that areas which had been clear-felled this year, and looked like they could become suitable for *C. myrmidone* in a year or two, may be replanted in the meantime. Only where the forest had been cleared to stop the spread of the bark beetles mentioned earlier was the continued existence of the larval foodplant ensured for a number of years and then only until the area scrubbed over.

Unlike Romania (Davies, M et al 2015), *C. myrmidone* in Belarus is essentially a woodland species occurring in open areas within a forest landscape. In this part of Belarus, outside of the forest, the land is intensively farmed for the growing of crops (principally maize). Very few niches for *C. myrmidone* existed in this sea of agriculture. Forestry, however, is still very important and of economic value (the number of buildings and residential properties made entirely of wooden materials bears witness to this). While this remains the case, the future of *C. myrmidone* in Belarus is fairly secure and the country can possibly now be viewed as the most important country in Europe in terms of the conservation of this species. A qualification here is that there is considerable uncertainty regarding the status of this species in Ukraine and, given the present political climate, this is likely to remain the case. A study of Google Maps Satellite view in the vicinity of the South Eastern Belarus border suggests the Ukraine has some large areas of forest. A more detailed investigation would be of value as obviously would be a visit. Contact with Ukrainian Lepidopterists would also be worthwhile and, if their identity can be ascertained, a copy of this report could be sent. The current effect on this area following the Chernobyl incident is not known by the authors but even minimal management in terms of forestry practices may be of value. It would be useful also to update our knowledge regarding the status and distribution of the species in Poland.

Colias myrmidone is recognised as an important species for conservation in Belarus and is included in the country's Red Data Book. Despite legal protection of the species it is clear that collecting and trade in specimens occurs (Anatoli Kulak, personal communication) and for this reason care needs to be taken to not divulge specific locations for *C. myrmidone* to a wider audience. While no specific management to benefit the species is being undertaken currently in Belarus, the continuation of normal forestry practices should ensure its survival into the future aided, at least in the short term, by additional control measures being carried out to control the spread of bark beetle. Conservation of the species is also helped by the number of wayleaves passing through areas of forest where rotational management of scrub under the power lines will also bring benefits.

It would be good to return to Belarus at some future point to follow up on this study perhaps gathering further information on distribution (just how wide is the distribution?), a better estimate of population size and the mobility of adults within the landscape.

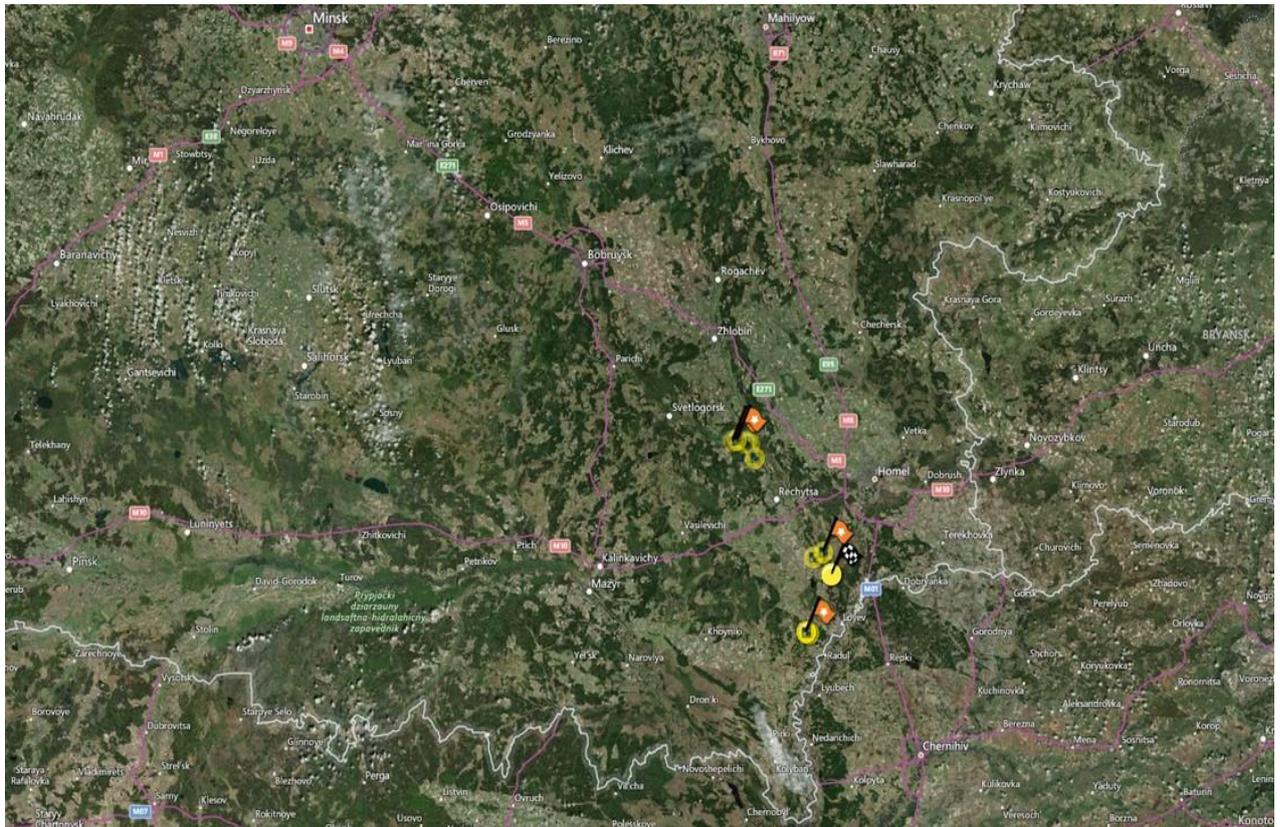
Acknowledgements

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Colias myrmidone photo by Anatoli Kulak

Appendix 1 Map showing the extent of forest cover in part of Rechitsa district visited by the survey team



Appendix 2 Photos of mature larva and pupa photographed in September by Anatoli Kulak





Appendix 3 Illegal trade of *Colias myrmidone*

Despite this being illegal in Belarus trade in specimens does occur with specimens being offered at up to 7 euros for a pair.

