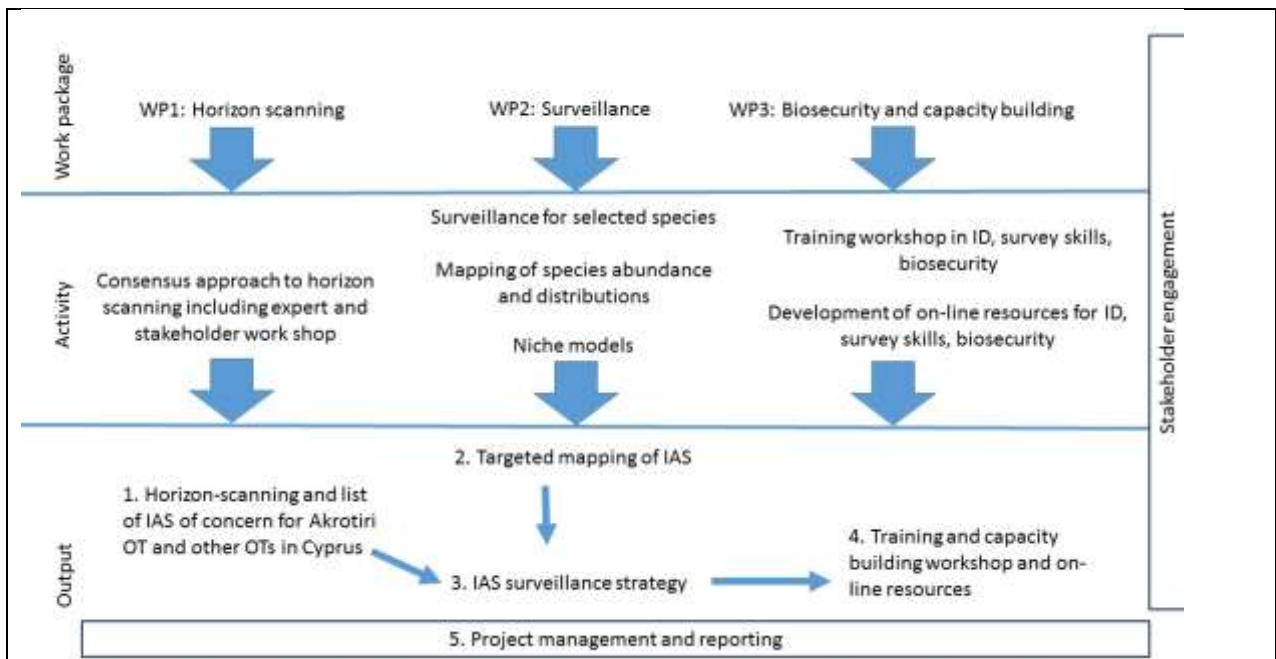


Darwin Initiative Main/Post/D+ Project
Half Year Report
(due 31stOctober 2017)

Project reference	DPLUS056
Project title	Assessment of current and future Invasive Alien Species in Cyprus
Country(ies)/territory(ies) –	SBAs of Cyprus – Akrotiri and Dhekelia, with possible surveys of Episkopi and Troodos
Lead organisation	Centre for Ecology and Hydrology
Partner(s)	Joint Services Health Unit, University of Cyprus
Project leader	Helen Roy and Jodey Peyton
Report date and number (e.g., HYR3)	<i>HYR1</i>
Project website/blog/social mediaetc.	www.ris-ky.eu Researching Invasive Species of Kýpros @RiskYAliens https://www.facebook.com/groups/riskycyprus

1. Outline progress over the last 6 months (April – Sept) against the agreed baseline timetable for the project (if your project has started less than 6 months ago, please report on the period since start up to end September).

The project is run in three work packages as detailed below:



For this project reporting, we have annotated the project implementation timetable (see end of report) and provided a brief update below. We have also included a mini report on the mosquito monitoring being undertaken (Annex 1). Here we provide a brief summary of the key points documented in more detail within the project implementation timetable.

WP1: Horizon scanning

The consensus approach to horizon scanning was completed on 27th April 2017 and concluded with the prioritisation of 225 species, with a list of the top 100 species also being identified. Fifty-four experts were involved including representatives from universities, NGOs and officials from both the SBA and Cyprus Government (Annex 2). A manuscript will be submitted to a peer-reviewed journal in January 2018, but the list of identified species has been already shared with participants. The programme for the Horizon Scanning workshop can be found in Annex 3.

WP2: Surveillance

The survey and mapping of ten species prioritised from the horizon scanning and consultation with the SBA and the University of Cyprus has begun, with mosquito monitoring being undertaken throughout the time period since project start up in April (Annex 1). Marine surveys are also being undertaken by the project team and volunteer divers who are following the methods developed by the team this summer. Botanical surveys will be reported in the annual report, although the project has already allowed for the publishing of a GIS dataset relating to invasive and non-invasive alien plant species observed around the lake immediately prior to the official project start date (<https://doi.org/10.5285/7c84e06d-bb1a-4aac-b1d7-33c11310d8a0>).

WP3: Biosecurity and capacity building

The project team has been taking advantage of opportunities for capacity building as they arise (for example, through invitations to contribute to school teaching), but we have also been delivering activities within the remit of the project. A one day capacity building workshop was held in August 2017 at the AEEC, and included [talks](#) by British and Cypriot Natural Historians and staff on monitoring and surveillance led by volunteers, NGOs, Government and Academia. As part of this workshop, the project designed and produced identification and information postcards, in English and Greek to highlight the challenges around [IAS](#).

As part of this Darwin project we have also mobilised data from previous surveys in [Akrotiri](#). All other data will be shared in a similar way, i.e. deposited in a repository, with biodiversity

occurrence data being pushed to GBIF where possible (this is in process for plant quadrat data associated with the resource found here: <https://doi.org/10.5285/7c84e06d-bb1a-4aac-b1d7-33c11310d8a0>).

Presentations to date:

The project and funders were mentioned in the following plenary lectures:

Roy, H.E. (2017) Unravelling the Ecology of Non-native Species to Inform European Strategy. Global Action Against Aquatic Invasive Species. ICAIS, Florida, 22-26 October 2017.

Roy, H.E. (2017) How to promote and benefit from the collaboration from citizen scientists. Ecology and Management of Alien Plant Invasions (EMAPI), Lisbon, 4-8 September 2017.

Roy, H.E. (2017) Sharing information on invasive non-native species across Britain and beyond. British Ecological Society The Macroecology of Alien Species: Patterns, Drivers and Consequences of Global Biotic Exchange. Durham, 24-26 July 2017

Peyton J. et al (2017) Horizon Scanning for Invasive Alien Species in Overseas Territories in Cyprus, also presented at EMAPI and a British Ecological Society special meeting on macroecology and plant invasions.

Table of activity as per the project timetable:

Activity	Q1	Q2	Progress
	Output 1 Horizon-scanning and listed IAS of concern for Akrotiri OT and other OTs in Cyprus	x	
1.1 Horizon scanning workshop, including identification of local and regional experts to invite	x	x	<p>Completed: The workshop was completed in April 2017 and over 200 Invasive Alien Species of potential threat to the SBAs and Cyprus as a whole identified. The scoring workshop was held as part of a larger workshop that entailed talks from British Staff, Cypriot NGOs, British Government Agencies, Cypriot Government staff and European and Israeli scientists. Details of this three day workshop can be found in Annex 3.</p> <p>As part of this HS workshop, we also generated a sub-list of species that could be of concern from a human health perspective. A manuscript on this activity is currently being prepared.</p> <p>The workshop participants were divided into four subgroups based on the following categories for assessment: Terrestrial vertebrates and invertebrates, freshwater invertebrates and vertebrates, plants and marine. Experts, using the European and British Horizon Scanning lists and other information sources as a starting point, carried out literature reviews to assess which species would or could be a threat to SBAs on Cyprus.</p>
1.2 IAS list prioritised for monitoring and remedial action – combined result of workshop and field survey evidence	x	x	<p>Both from this workshop, and through ongoing consultation with stakeholders, the following potentially invasive alien species, and one native species have been identified for monitoring and survey:</p> <ol style="list-style-type: none"> 1. Port Jackson Willow <i>Acacia saligna</i> 2. Eastern Mosquitofish <i>Gambusia holbrooki</i> 3. Mediterranean Killifish <i>Aphanius fasciatus</i> 4. Mosquitoes with particular attention on appearance of species of concern: <i>Aedes albopictus</i> and <i>Aedes aegypti</i> 5. Lionfish <i>Pterois miles</i> 6. Toadfish <i>Lagocephalus</i> spp. 7. Rabbitfish <i>Siganus</i> spp. 8. Cornetfish <i>Fistularia commersonii</i>. 9. <i>Casuarina</i> spp. 10. <i>Eucalyptus</i> spp.

Activity	Q1	Q2	Progress
	Output 2 Targeted mapping of IAS for Akrotiri and other OTs in Cyprus, where resources allow		x
2.1 Comprehensive mapping of at least 10 IAS			Marine, terrestrial invertebrates and plant all started, with freshwater vertebrate surveys beginning in March 2018.
2.2 Completed vegetation and habitat mapping of Akrotiri and other OTs in Cyprus, where resources allow, with overlay of IAS occurrence	x	x	Started and will continue in February when team re-visit Cyprus.
Output 3 IAS surveillance strategy	x	x	In progress – survey plans completed.
3.1 On-line recording website established as part of project website (focussed on at least 10 priority IAS)	x	x	Website established with development of online recording capability underway
3.2 Design of locally implementable field-based monitoring strategy for Akrotiri and other OTs, based on lists and evidence from 1.1, 1.2, 2.1, 2.2 and 2.3	x		See survey plans in Appendix A
Output 4 Training and capacity building workshops	x	x	Kelly Martinou led alongside Helen Roy and other scientists a school lesson at the Akrotiri Environment Education Centre (AEEC) in the April workshop. The project ran a specific one day capacity building workshop in August 2017 at the AEEC which included talks by British and Cypriot Natural Historians and staff on monitoring and surveillance led by volunteers and NGOS and Government and Academia. Please see Annex 5 for the programme for this workshop. The project designed and produced identification and information postcards, in English and Greek to highlight the challenges around invasive Alien Species. See Annex 6 for a copy of these postcards. We are currently working on an activity to implement, aligning with the school curriculum, for the Akrotiri Environment Education Centre for school children to learn about invasive alien

Activity	Q1	Q2	Progress
4.1 Project start-up meeting and scoping survey	x		The team have had numerous meetings and are regularly in contact through email and Skype. The core team e-mails at least weekly and has Skype meetings every month
4.2 Pre-survey workshop and training event occurs	x		The pre-survey workshops and training events have been aligned with April and August 2017 workshops and the marine and terrestrial invertebrates team are continuing to undertake training with volunteers. UCY has contacted local divers, who expressed an interest in participating in the surveys. At least five volunteers have successfully participated in one of the surveys and will participate in future, monthly surveys from now on. This will provide the marine team with additional data, expanding the surveys at no additional cost.
4.3 Capacity building	x	x	Ongoing through the entire six months with regular events at the AEEC run by Kelly Martinou; the marine team, led by Monica Demetriou are training diver volunteers. Kelly Martinou is running workshops regarding raising awareness for invasive mosquitoes for children groups but also for adult groups (next planned activity expected to take place at the AEEC on the 4 th of December for the University of the 3 rd Age group who run a biodiversity club).
4.4 Year 2 training			Not yet in progress
Output 5 Project management and reporting	x	x	This is ongoing.
5.1 Teleconference to assess year 1 and set up for year 2			End of year 1 activity
5.2 Progress teleconference meetings	x	x	Monthly meetings or email correspondence
5.3 Annual Report			Year 1 activity
5.4 Half year report			Current report
5.5 Project closure meeting			Year 2 activity
5.6 Final report			Year 2 activity
5.7 Publications produced			Horizon Scanning manuscript underway; book chapter on the historical context of several of the most high profile alien plant species is in press (see www.ris-ky.eu/resources).

2a. Give details of any notable problems or unexpected developments/lessons learnt that the project has encountered over the last 6 months. Explain what impact these could have on the project and whether the changes will affect the budget and timetable of project activities.

There have been no problems or challenges with the project to date.

2b. Have any of these issues been discussed with LTS International and if so, have changes been made to the original agreement?

Discussed with LTS: Yes/No

Formal change request submitted: Yes/No

Received confirmation of change acceptance Yes/No

3a. Do you currently expect to have any significant (e.g., more than £5,000) underspend in your budget for this year?

Yes No Estimated underspend: £

3b. If yes, then you need to consider your project budget needs carefully. Please remember that any funds agreed for this financial year are only available to the project in this financial year.

If you anticipate a significant underspend because of justifiable changes within the project, please submit a rebudget Change Request as soon as possible. There is no guarantee that Defra will agree a rebudget so please ensure you have enough time to make appropriate changes if necessary.

4. Are there any other issues you wish to raise relating to the project or to Darwin's management, monitoring, or financial procedures?

No, the project is progressing well. The team is working together effectively. We are grateful to Darwin for the funding and also rapid response to our queries.

If you were asked to provide a response to this year's annual report review with your next half year report, please attach your response to this document. Additionally, if you were funded under R23 and asked to provide further information by your first half year report, please attach your response as a separate document.

Please note: Any planned modifications to your project schedule/workplan can be discussed in this report but **should also be raised with LTS International through a Change Request.**

Please send your **completed report by email** to Eilidh Young at Darwin-Projects@ltsi.co.uk. The report should be between 2-3 pages maximum. **Please state your project reference number in the header of your email message e.g. Subject: 22-035 Darwin Half Year Report**

Annex 1: Six month Mosquito surveillance report

Introduction

Worldwide vector-borne diseases are a critical issue with respect to Human Health. Global trade and facilitation of human movement due to modern means of transport as well as phenomena such as climate change have resulted in the introduction of non-native mosquitoes to areas outside their natural range. It has also led to the spread of mosquito-borne pathogens to places where they have previously been eradicated or were non-existent. Dengue, yellow fever, Zika and chikungunya are a few of the diseases associated with mosquito-borne pathogens. Vector-borne diseases continue to pose a risk to human health, and the increased prevalence of emerging diseases such as dengue chikungunya and Zika virus highlights the need for surveillance and management action plans at local, regional and national level as well as continuous research in the biology, ecology and behaviour of vector species.

Aedes aegypti [= *Stegomyia aegypti*] and *Aedes albopictus* [= *Stegomyia albopicta*] are mosquito vectors of globally important arboviruses, including dengue virus (DENV), yellow fever virus, and chikungunya virus (CHIKV). The best disease prevention method requires the early detection and control of mosquito vectors before they manage to establish to new sites. As these diseases can only persist where their mosquito vectors, *Ae. aegypti* and *Ae. albopictus* are present, understanding the distributions of these two mosquito species is an important strategy at sites where they are already established.

The biology and ecology of *Aedes aegypti* and *Aedes albopictus*

Aedes (Stegomyia) aegypti (yellow fever mosquito), originates from Africa and it is a known vector of yellow fever and dengue virus, chikungunya & Zika virus. In Europe many imported cases are reported every year. The main diagnostic character of the yellow fever mosquito is the presence of silver scales in a shape of a lyre on a black background on the scutum (dorsal part of the thorax). The domestic form (*Ae. Aegypti aegypti*) is paler than its ancestor (*Ae. Aegypti formosus*) with white scales on the first abdominal tergite. The latter is confined to Africa in more natural habitats. Historically, it was established in all Mediterranean, Caucasus, continental Portugal, Canaries and Azores. In Cyprus it was last recorded in the 1930s. Currently distributed throughout the tropics (Africa, subtropical regions of South-eastern US, Middle East, Southeast Asia, Pacific and Indian Islands and Northern Australia). It shows a feeding preference for mammals preferably human. The yellow fever mosquito feeds multiple times during one gonotrophic cycle (feeding, egg-producing cycle) which has implications for disease transmission. Natural habitats include forest specifically tree holes but adapted to urban habitats including aquatic containers both indoors and outdoors such as vases, water tanks, tyres, underground septic tanks. Eggs are laid on or near the water surface, they are resistant to desiccation. Its biting activity is diurnal and crepuscular. It has a flight range of only 200m. It is unable to undergo winter diapause as eggs, and this therefore limits their ability to exploit more northerly temperate regions. It may establish in regions of Europe showing a humid subtropical climate (e.g. parts of Mediterranean and Black Sea countries) such as the Sochi region where it has established again since 2001. A decrease in the distribution of *Ae. aegypti* has been associated with the invasion of *Ae. albopictus*, especially in south-eastern USA. This species' preference for artificial water containers means it does not have to rely on rainfall for larval development sites. Coupled with its preference for feeding and resting indoors, these aspects make this species less susceptible to the effects of climatic factors which could influence

Aedes (Stegomyia) albopictus (Asian tiger mosquito, forest day mosquito) originates from South East Asia. It is a known vector of: chikungunya virus, dengue virus and dirofilariasis. It is a relatively small mosquito with black and white pattern, the diagnostic character is the median silver-scale line against a black background on the scutum (dorsal part of the thorax).

In Cyprus, *Aedes albopictus* can be confused with native species *Ae. cretinus* (restricted to Cyprus, Greece and Turkey). The differentiation with *Ae. cretinus* needs a detailed check by an entomologist. First record of importation in Europe was 1979 in Albania. Temperate populations overwinter by producing eggs that go under winter diapause. These diapausing eggs can survive cold spells of -10°C. The Asian tiger mosquito has 5-17 generations per year. It is an opportunistic feeder, humans, domestic and wild animals, reptiles, birds and amphibians but prefers humans. Its preferred breeding habitats are barrels, rainwater gully catch basins, treeholes, rockpools, urban and sub-urban settings in the tropics. It is a superior competitor for food with *Aedes triseriatus* and *Aedes japonicus*. It bites aggressively during the day outdoors causing serious biting nuisance. It can be found around parking lots on motorways, in vases in cemeteries. Italy is the most infested country in Europe.

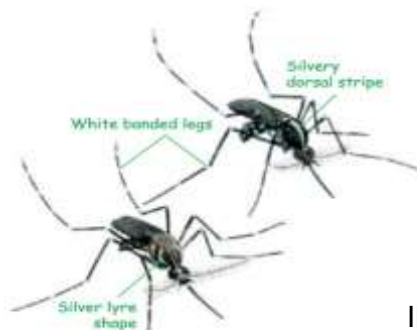


Illustration by Chris Shields for Ris-ký

Figure 1: Illustrations for *Aedes aegypti* and *Aedes albopictus*

Aim and Scope of the study

The aim or scope of the study was the early detection of *Aedes aegypti* and *Aedes albopictus* not yet present on the island of Cyprus.

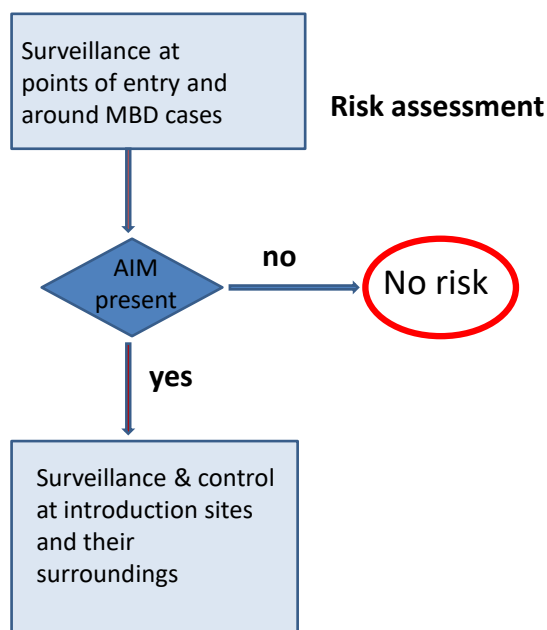
Specific Objectives

- The early detection of alien or non-native invasive species that belong to the genus *Aedes* not yet present on the island of Cyprus and more specifically the Sovereign Base Areas by aiming at points of entry.
- Design rapid response measures in case of invasion
- Capacity building between national and international experts on issues concerning vector borne diseases, vector ecology, surveillance and management strategies
- Raising public awareness regarding invasive *Aedes* mosquitoes
- Adopting a citizen science approach in order to facilitate the early detection of invasive *Aedes* species but also in order to monitor activity of existing putative vector species

As the two species are not yet present on the island a surveillance network was set up (according to ECDC guidelines on invasive mosquitoes scenario) in order to allow the early detection of an introduction/initial spread of alien invasive mosquitoes (aim) before

they permanent populations and spreads over a wide area. Point of entry such as the Limassol port and the RAF airport were pre-defined high-risk sites as the constitute points of entry (PoE).

Figure 2: Decision diagram regarding risk associated with mosquito borne diseases at West Sovereign Base area (adapted from European Centre and disease control guidelines) showing the scenario 1 no established invasive mosquito species (but with risk of introduction and establishment).



Methods

In order to monitor for the two invasive alien species of mosquitoes a network of traps was set at points of entry (PoE) within and adjacent to Akrotiri SBA (RAF airport and Limassol port) and three additional sites within SBA in order to provide better monitoring coverage on the 11/04/2016. BG sentinel traps with BG lure were used for monitoring purposes which are considered the ideal traps for the two species of interest. The traps were set up for 24 hour intervals every two weeks or weekly. All specimens collected in the traps were transferred to the Laboratory of Vector Ecology and Applied Entomology (JSHU) where they were morphologically identified by AF Martinou.



Figure 3: Yellow pins depict the sites where the BG-Sentinel traps were set



Figure 4 (a,b,c): Illustration of BG –sentinel trap and BG-lure.

Results

Our preliminary results from the monitoring programme show that *Aedes aegypti* and *Aedes albopictus* are not yet present at the points of entry or any of the sites within SBA. Native mosquito populations caught and recorded in the traps that were set (raw data provided) were *Ochlerotatus detritus* and *Culex pipiens* (WNV vector) both common species within the Akrotiri peninsula. *Ochlerotatus detritus* is the main nuisance species. Data will be analysed for the final report.

Discussion and future work

Monitoring is planned to continue throughout 2017-2018 and an additional raising awareness programme for alien invasive mosquitoes will be initiated combining citizen science activities mainly designed for children age 7-18 but also other groups that might be interested. All activities will take place at the Akrotiri Environmental Education Centre and the adjacent to the saltmarsh areas where children will be able to sample and learn about mosquitoes and their natural enemies

References

www.ecdc.europa

Annex 2: Attendees for horizon scanning workshop

Full name	email	Role/area of expertise	Official letter sent	presenting	Country	Institute
Helen Roy	hele@ceh.ac.uk	facilitator	NA	y	UK	CEH
Jodey Peyton	joyt@ceh.ac.uk	facilitator	NA	y	UK	CEH
Oliver Pescott	olipes@ceh.ac.uk	Plant (terrestrial and freshwater)	NA	y	UK	CEH
Marc Botham	math2@ceh.ac.uk	Vertebrate and Invertebrate (terrestrial)	NA	y	UK	CEH
Ian Winfield	ijw@ceh.ac.uk	Vertebrate and Invertebrate (freshwater)	NA	y	UK	CEH
Kath Turvey	kattur@ceh.ac.uk	facilitator	NA	n	UK	CEH
Steffi Schafer	smsc@ceh.ac.uk	Vertebrate and Invertebrate (terrestrial)	NA	y	UK	CEH
Olaf Booy	Olaf.Booy@apha.gsi.gov.uk	Legislation	11/03/2017	y	UK	GBNNS
Tim Adriaens	tim.adriaens@inbo.be	Vertebrate and Invertebrate (terrestrial)	11/03/2017	y	Belgium	Research Institute for Nature and Forest
Margarita Arianoutsou	marianou@biol.uoa.gr	Plant (terrestrial and freshwater)	11/03/2017	y	Greece	University of Athens
Ioannis Bazos	ibazos@biol.uoa.gr	Plant (terrestrial and freshwater)	11/03/2017	y	Greece	University of Athens
Pinelopi Delipetrou	pindel@biol.uoa.gr	Plant (terrestrial and freshwater)	11/03/2017	y	Greece	University of Athens
Argyro Zenetos	zenetos@hcmr.gr	Marine	11/03/2017	y	Greece	Hellenic Centre for Marine Research
Bella Galil	bella@ocean.org.il	Marine	11/03/2017	y	Israel	National Institute of Oceanography

Alex Kirschell	kirschel@ucy.ac.cy	Vertebrate and Invertebrate (terrestrial)	11/03/2017	n	Cyprus	University of Cyprus
Niki Chartosia	nchartos@gmail.com	Marine	11/03/2017	y	Cyprus	University of Cyprus
Monica Demetriou	demetriou.monica@ucy.ac.cy	Marine	11/03/2017	y	Cyprus	University of Cyprus
Elli Tzirkalli	elli_tj@hotmail.com	Vertebrate and Invertebrate (terrestrial)	11/03/2017	n	Cyprus	Cyprus Butterfly Conservation Group
Margarita Hadjistylli	mhadjistylli@environment.moa.gov.cy	Legislation	11/03/2017	y	Cyprus	Cyprus Department of Environment
Nicolas Michaelides	nmichailidis@dfmr.moa.gov.cy	Marine	11/03/2017	n	Cyprus	Marine Department RoC
Kelly Martinou	BFC-JSHU-HQ-Entomologist@mod.uk	Vertebrate and Invertebrate (terrestrial)	11/03/2017	y	Cyprus	Joint Services Health Unit
Glen Bullivant	Kelly contact	capacity building		y	Cyprus	Joint Services Health Unit
Pantelis Charilaou	pantelis99@cytanet.com.cy	Plant (terrestrial and freshwater)	11/03/2017	y	Cyprus	Sovereign Base Areas
Thomas Hadjikyriakou	akrotiricentre@cytanet.com.cy	Vertebrate and Invertebrate (terrestrial)	14/03/2017	n	Cyprus	Sovereign Base Areas
Koula Michael	Kelly contact	capacity building		n	Cyprus	Sovereign Base Areas
Sophie Kammenou	Kelly contact	capacity building		n	Cyprus	Sovereign Base Areas
Davey Reynolds	DIOSEE-EPSPEnv1b@mod.uk	capacity building	14/03/2017	n	Cyprus	Sovereign Base Areas
Athina Papatheodoulou	athina.papatheodoulou@gmail.com	Vertebrate and Invertebrate (freshwater)	11/03/2017	n	Cyprus	IACO, Private company
Christina Ieronymidou	christina.ieronymidou@birdlifecyprus.org.cy	Vertebrate and Invertebrate (terrestrial)	20/03/2017	n	Cyprus	Director Birdlife Cyprus
Nikos Kassinis	nkassinis@cytanet.com.cy	Vertebrate and Invertebrate (terrestrial)	11/03/2017	n	Cyprus	Dept of Hunting
Charis Nikolaou	nicolaouharis@cytanet.com.cy	Vertebrate and Invertebrate (terrestrial)	11/03/2017	n	Cyprus	
Elena Tricarico	elena.tricarico@unifi.it	Vertebrate and Invertebrate (freshwater)	11/03/2017	n	Italy	University of Florence
Maria Koliou	mkoliou@spidernet.com.cy ;	Vertebrate and Invertebrate (terrestrial)	14/03/2017	n	Cyprus	MD, Minsitry of Health, Cyprus

Comms Person	Kelly contact	capacity building		n	Cyprus	JSHU & BFC & SBA
Philip Rushbrook	Kelly contact	capacity building		y	Cyprus	Sovereign Base Areas
Kevin Shawcross	Kelly contact	capacity building		n	Cyprus	Joint Services Health Unit
NeofytosAndreou	Kelly contact	capacity building		n	Cyprus	Joint Services Health Unit
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Adam Sellars	Kelly contact	capacity building		n	Cyprus	Joint Services Health Unit
Erdogan (JSHU)	Kelly contact	capacity building		n	Cyprus	Joint Services Health Unit
LefkiosSergides	sergides@gmail.com	Plant (terrestrial and freshwater)		y	Cyprus	Terra Cypria
Jill Key	jkey1316@gmail.com	Legislation	n	y	UK	Consultant
DemetrisKletou	dkletou@merresearch.com	Marine	n	y	Cyprus	Consultant
Gerald Dörflinger	gdorflinger@wdd.moa.gov.cy	Vertebrate and Invertebrate (freshwater)	y	n	Cyprus	Dept of Water Development
GirogiosPayiatas	gpaiatas@dfmr.moa.gov.cy	Legislation		n	Cyprus	Dept. of fisheries
IacovosTziortzis	tziortzisi@gmail.com	Vertebrate and Invertebrate (freshwater)		n	Cyprus	Water Department
Paraskevi Manolaki	paraskevi.manolaki@gmail.com	Plant (terrestrial and freshwater)		n	Cyprus	Open University of Cyprus
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Paraskevi Karachle	pkarachle@hcmr.gr	Marine		n	Greece	University of Athens
George Kerametsidis	bio3491@upnet.gr	Plant (terrestrial and freshwater)		n	Greece	University of Athens
Carlos Jimenez	c.jimenez@cyi.ac.cy	Marine		n	Cyprus	EnaliaPhysis Environmental Research Centre

Annex 3: Programme for Horizon Scanning Workshop



Centre for
Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL



Joint Services Health Unit



University of Cyprus
Department of Biological
Sciences



DARWIN
INITIATIVE

Assessment of current and future Invasive Alien Species in Cyprus

Akrotiri Environmental Education Centre (AEEC)
4640, Akrotiri village, Cyprus

26th – 27th April 2017

Programme

Day 1: IAS in Cyprus and Europe – the current picture

*Registration opens from 0830, minibus depart Limassol Hotel at 0830 and arrives at Akrotiri at 0900.
Coffee on arrival*

Chairs: Helen Roy and Kelly Martinou

0930 – 0945 Welcome and Introduction: Gp Capt Gwynne Harper BFC & Cpt. Glen Bullivant JSHU, BFC

0945 – 1005 Introduction to Darwin Project and alien species in Europe: Helen Roy, CEH

1005 – 1030 Introduction to alien species in Cyprus and Trends in introduction of new species and their pathways in the Mediterranean: Kelly Martinou JSHU, BFC and Argyro Zenetos, HCMR

Monitoring and Surveillance – UK – 10 minute talks with 5 minutes for questions at the end

1030 – 1040 GB Alert System: Marc Botham, CEH

1040 – 1050 Vector monitoring: Steffi Schafer, CEH

1050 – 1100 Monitoring and surveillance – freshwater fish: Ian Winfield, CEH

1100 – 1105 Discussion

1105 – 1135 Coffee

1135 – 1205 Background and history of SBA: Chief Officer Rushbrook, SBA and Pantelis Charilaou, SBA

Monitoring and Surveillance – Mediterranean – 12 minute talks with 3 minutes for questions at the end of each talk

1205 – 1220 Lionfish monitoring: Demetris Kletou, MER

1220 – 1235 Patterns of plant invasions in the Mediterranean: Margarita Arianoutsou, University of Athens (UoA)

1235 – 1245 Plant invasions in Cyprus: Pinelopi Delipetrou, UoA

1245 – 1300 Alien Flora of Greece: Yiannis Bazos, UoA

1300 – 1500 Lunch – picnic and field excursion around the AEEIC and the margins of the salt lake.

Annex 4: Survey Plans for four taxonomic groups identified through Horizon Scanning and expert opinion

Taxon group: Marine
Personnel
Monica Demetriou* (UCY), Yianna Samuel (UCY), Georgios Fyttis (UCY), Andreas Dimitriou (UCY), Pantelis Savvides (UCY) *demetriou.monica@ucy.ac.cy
Main target species
<i>Lagocephalus</i> spp., <i>Siganus</i> spp., <i>Fistularia commersonii</i> , <i>Pterois miles</i>
Other potential species
Any other established alien marine species (algae, invertebrates, fish) as listed in the Initial Assessment Of the Marine Environment of Cyprus (2012); species may also be recorded if they were captured by the Ris-Ky horizon scanning exercise, or are considered likely to establish by surveyors.
Target habitats of particular importance (include Habitats Directive Annex 1 or other conservation-relevant codes if known)
*Posidonia beds (11.34), reefs, sandy habitats
Target area
Akrotiri and Dekheleia SBAs
Sampling strategy (for target spp.)
The presence of target species will be recorded using Underwater Visual Census methodology, both at shallow and deeper depths. Specifically, for fish assessments, strip transects (25x5 m ²) will be used, whereas for benthic species recording, point intercept photo transects will be used.
Strategy limitations?
The participation of volunteer divers for additional data collection might produce bias. However, this bias will be minimised by using photo-quadrats. The sampling plan might need to change in occasions due to weather conditions, particularly during winter.
Sampling time scale(s)
Sampling is planned to take place seasonally in Akrotiri (August, November 2017, February, May, August, November 2018), and a baseline survey will take place in October 2017 and 2018 in Dhekeleia. Additional sampling is planned to take place the rest of the months of 2017 and 2018 with the help of volunteer divers.
Expected outputs (e.g. raw data type, maps, lists etc.)
SBA atlas of marine alien species; raw data; occurrence maps; lists of invaded habitats where appropriate.

Taxon group: Plants	
Personnel	Oli Pescott* (CEH), Jodey Peyton (CEH), Owen Mountford (consultant) *olipes@ceh.ac.uk
Main target species	<i>Acacia</i> spp., <i>Eucalyptus</i> spp., <i>Casuarina</i> spp.
Other potential species	Any other established alien plant species as listed in Peyton & Mountford (2015); planted species may also be recorded if they were captured by the Ris-Ký horizon scanning exercise, or are considered likely to establish by surveyors.
Target habitats of particular importance (include Habitats Directive Annex 1 or other conservation-relevant codes if known)	Phrygana, maquis, sand dunes, salt meadows, salt marsh.
Target area	Akrotiri and Dekhelia SBAs
Sampling strategy (for target spp.)	The presence of target species will be recorded within a regular grid of ~500 x 500 m (aligned to an appropriate local geographic projection), with a qualitative 'DAFOR' assessment for all occurrences (i.e. Dominant, Abundant, Frequent etc.). GPS-enabled tablets with base-mapping will be used for navigation and data capture (as in previous sampling visits).
Strategy limitations?	Local (i.e. at the scale of metres) abundances will not be captured by this approach, but the aim is to produce SBA 'Atlas'-style maps for all alien plant species encountered, rather than assessing local impacts (which have been assessed during other visits). The allotted resources may not be sufficient to sample all grid cells of the SBAs; the scope of the recording and the potential and need for further visits will be reviewed as the project progresses.
Sampling time scale(s)	At least two weeks in late March 2018; data from earlier field visits will also be incorporated into mapped outputs. An earlier field visit in the winter of 2017/18 is also being considered.
Expected outputs (e.g. raw data type, maps, lists etc.)	Raw data (point-based shapefile); grid-based occurrence maps; comprehensive SBA lists of alien plants; lists of invaded habitats where appropriate.

Taxon group: Fish
Personnel
Ian J. Winfield* (CEH), Kelly Martinou (JSHU) *ijw@ceh.ac.uk
Main target species
<i>Gambusia</i> spp., <i>Aphanius fasciatus</i> .
Other potential species
Any other native or alien fish species. Only a very few (< 5) such species are likely to be encountered.
Target habitats of particular importance (include Habitats Directive Annex 1 or other conservation-relevant codes if known)
Wetlands.
Target area
Akrotiri SBA.
Sampling strategy (for target spp.)
The presence of target species will be recorded by point sampling within appropriate grid cells of the Akrotiri SBA. Sampling technique is yet to be decided but extensive use of baited Gee minnow traps of a standard design currently appears to be the most appropriate approach, supported by some limited seine netting and potentially underwater photography. Catches will be identified, counted, measured and returned alive. There may be some species-specific bias, but the approach will nevertheless allow the consistent calculation of catch-per-unit-effort. At a minimum, this will facilitate a qualitative 'DAFOR' assessment for all occurrences (i.e. Dominant, Abundant, Frequent etc.). Relevant environmental features, particularly salinity, will also be recorded at each sampling site. Timing of sampling is yet to be decided, but it would be useful to cover both summer (dry) and winter (wet) seasons. Relevant discussions are currently in progress with Stamatis Zogaris (HCMR, Greece) and Brian Zimmerman (ZSL, UK) who have highly relevant recent experience with the target species at Akrotiri and elsewhere.
Strategy limitations?
The aim is to produce SBA 'Atlas'-style maps for <i>Gambusia</i> spp., <i>Aphanius fasciatus</i> and the few other fish species likely to be encountered, but local impacts will not be assessed other than by looking at potential impacts inferred by relative abundances. The allocated resources may not be sufficient to sample all appropriate grid cells of the SBAs and standard seine netting may prove to be impractical. The scope of the recording and the potential and need for further visits will be reviewed as the project progresses.
Sampling time scale(s)
To be determined following further discussions and analysis of trapping data already held by JSHU, but as noted above it is desirable to cover both summer (dry) and winter (wet) seasons.
Expected outputs (e.g. raw data type, maps, lists etc.)
Raw data (point-based shapefile); grid-based occurrence maps; comprehensive SBA lists of alien fish; lists of invaded habitats where appropriate.

Taxon group: INSECTS- MOSQUITO VECTORS	
Personnel	Kelly Martinou (BFC-JSHU-HQ-Entomologist@mod.uk), Neo Andreou, Christous Christou, Kevin Shawcross, Jim Fawcett (Joint Services Health Unit Cyprus)
Main target species	<i>Aedes albopictus</i> and <i>Aedes aegypti</i> (not present yet on island)
Other potential species	Any other autochthonous or already established mosquito species and other insect vectors
Target habitats of particular importance (include Habitats Directive Annex 1 or other conservation-relevant codes if known)	Points of entry (RAF airport, Limassol port) and three adjacent urbanized sites
Target area	Akrotiri with the plan to expand to Dekheleia and Episkopi hills
Sampling strategy (for target spp.)	The presence of target species will be investigated at selected sites by placing BG sentinel traps with BG lures for 24 hours every two weeks. All captured mosquitoes and other insects will be transferred to the Laboratory of Vector Ecology and Integrated Vector Management in Akrotiri, counted, separated into sexes and identified to species level.
Strategy limitations?	The BG sentinel traps with BG lure are the ideal traps for capturing invasive mosquitoes such as <i>Aedes albopictus</i> and <i>Aedes aegypti</i> however ideally they should operate for 4 consecutive nights. This is not an option currently though as at the sites that they will be placed they will operate on batteries.
Sampling time scale(s)	From April 2017 onwards every two weeks
Expected outputs (e.g. raw data type, maps, lists etc.)	Raw data, list of mosquito species recovered from the traps, possibility for time series analysis at the end of the project

Annex 5: Capacity building workshop programme



Capacity Building in Monitoring and Surveillance of native and non-native species

Akrotiri Environmental Education Centre (AEEC) 4640, Akrotiri village, Cyprus

31st August 2017

Programme

Registration opens from 0900 with coffee and tea

Morning session: What are we recording and why?

Chairs: Jodey Peyton and Kelly Martinou

0930: Welcome -Thomas Hadjikyriakou, Director, AEEC

0945: RIS-Ký Overview & Outline of the day -Jodey Peyton, RIS-Ký Project Manager, CEH

1000: Biological recording – filling evidence gaps - The UK – EU perspective Keynote speaker David Roy, Head of Biological Records Centre, CEH

1030: Overview of Monitoring Biodiversity in the SBA –Pantelis Charilaou, Environment Officer, SBA

1100: Wildlife monitoring in Cyprus – Nikos Kassinis, Senior Game and Wildlife Officer, Game and Fauna Service

1120 – 1150: Coffee break

1150: Overview of marine IAS monitoring in Cyprus -Monica Demetriou, Marine Biologist, University of Cyprus

1210: Dragonflies of Akrotiri-David and Ros Sparrow, Heads of Dragonfly Study group

1230: Invasive mosquito monitoring - Are we doing enough? Kelly Martinou, RIS-Ký Project Manager and Entomologist- JSHU

1240: Recording Invasive Plants in the SBA - Oli Pescott, Plant Ecologist, CEH

1300: Bird monitoring in Cyprus -Experiences of Birdlife Cyprus, Christina Ieronymidou, Monitoring and Research Coordinator Birdlife Cyprus

1320 - 1420: Lunch, app demonstration and poster session on work in SBA

Afternoon session: Linking objectives and people

Chairs: Jodey Peyton and Oli Pescott

1420: Engaging your audience – Experiences from the UK Ladybird recording scheme, Helen Roy, RIS-Ký Project Leader, CEH

Results of online questionnaire - Opportunities for using Citizen Science to monitor biodiversity in Cyprus

1450: Summary of results of online questionnaire - Kelly Martinou

1500: Group discussions

1530: Coffee break (to be taken back to seat for continued discussions)


1645: Kelly, Jodey and Helen to close the discussions and discuss RIS-Ký future directions

1700: Day closes


Lunch, coffee and soft drinks will be provided to all participants

Annex 6: Postcards produced and used for capacity building. Species selected from Horizon Scanning Exercise and expert opinion


Mini guide to **invasive alien species**




Harlequin ladybird
Harmonia axyridis
Native to Asia. Introduced to some European countries as a biocontrol agent for pest insects. Threatens other species (e.g. native ladybirds) through competition and predation.




Ring-necked parakeet or Rosy-ringed parakeet
Pseudaacula krameri
Native across West Africa to lowland India. Screeching call. Large flocks threaten agriculture by feeding fruits and crops and by carrying pathogens that infect poultry.




Bermuda buttercup
Oxalis pes-caprae
Native to South Africa. Can become dominant over disturbed land such as road verges, olive and citrus groves, vineyards and crop fields, reducing native vegetation and germination of crops.




Silvery lacewing
Chrysopa carnea




White-headed langur
Presbytis leucoceros




Asian tiger (above) and yellow fever mosquito (left)
Aedes albopictus and *Aedes aegypti*
Native to Asia. Introduced worldwide (into Europe through the used tyre trade) and very hard to control, so early warning essential. Transmit diseases such as Zika, yellow fever, dengue and chikungunya.




Eastern mosquitofish *Gambusia holbrooki*
Native to USA. Small live-bearing fish introduced to many countries to control mosquitoes. Threat to the native Mediterranean killifish (*Aphanius fasciatus*), acts aggressively towards it (biting and fin-nipping) and competes for food.




Silver sheepshead
Lepidotrigla cavillone




Common lionfish or devil firefish *Pterois miles*
Native to Indian Ocean. Entered the Mediterranean through the Suez Canal. Voracious predator bearing venomous spines.



Asian tiger mosquito
Aedes albopictus




Common lionfish or devil firefish *Pterois miles*
Native to Indian Ocean. Entered the Mediterranean through the Suez Canal. Voracious predator bearing venomous spines.




Asian tiger mosquito
Aedes albopictus


Μικρός οδηγός για **τα εισβλητικά ξενικά είδη**




Πασιγαλίτσα
Harmonia axyridis
Πατριδική της Ασίας. Εισαχθή στην Ευρώπη ως παράγοντας βιοελεγχής εντόμων αγροτών. Απειλεί τα άλλα αρθρόποδα είδη εντόμων (π.χ. τις πασιγαλίτσες εθνικής της Ευρώπης) μέσω ανταγωνισμού και θήρασης.




Πασιγαλιόνα *Ringneck Pseudaacula krameri*
Πατριδική από τη δυτική Αφρική μέχρι την Ινδία. Με χαρακτηριστική ηχηρή κάλυψη. Μεγάλη ομάδα από ταύται απειλεί για τη γεωργία καθώς τρώει φρούτα με καρπούς των καλλιεργειών, μεταφέρουν παθογόνα που μπορεί να ασθένειες σε τα υαίδια.




Ξεθαλίδα ή Ξινίδα
Oxalis pes-caprae
Πατριδική της Ν. Αφρικής. Μπορεί να εισαχθεί σε αγροτικές, σε γή που έχει κατισπυλωθεί όπως άσπες, δρόμους, αλκατέρας, παρακαταστάσεις άλλες καλλιέργειες κτλ.




Ασημένια λαυρήτσα
στη πόδα




Ασημένια λαυρήτσα
Presbytis leucoceros




Κοινοειδί Τίγρης (ανωτά) και Κοινοειδί του κίτρινου κερταού (αριστερά) Aedes albopictus και Aedes aegypti
Πατριδική της Ασίας. Μεταφέρονται πω κοσμάκις από τον άνθρωπο. Αν εγκατασταθούν εξαπλώνονται. Υψηλός κ. η αντιμετώπιση τους είναι εξαιρετικά δύσκολη για αυτό ο έλεγχος αντιμετώπισης τους είναι απαραίτητος. Μεταβιβάζουν ασθένειες όπως Zika, κίτρινης και δάγκουας πυρετός και χικουνγκυα.




Κοινοειδίφαρο *Gambusia holbrooki*
Πατριδική των ΗΠΑ. Εισαχθή σε πολλές χώρες για την αντιμετώπιση των κοινωπιτών. Απειλεί απειλή καθώς είναι υαίτερα επιθετικό προς το μικρό εδαφικό ψάρι της Μεσογείου, την ζαμπέρλα (*Aphanius fasciatus*) το για τροφή.



Ασημένια λαυρήτσα
Lepidotrigla cavillone



Λεοντόψαρο *Pterois miles*
Πατριδική του Ινδικού Ωκεανού. Το ανταγωνιστικό λεοντόψαρο θήρασε στη Μεσόγειο μέσω της διασποράς του Σουέζ. Απειλεί τους σκοπίνες και τα αγάλια του κίονα το ξινάει.



Asian tiger mosquito
Aedes albopictus

Half Year Report Format – March 2017