Section 91 Licence

Application under the *Threatened Species Conservation Act 1995* to harm or pick a threatened species, population or ecological community* or damage habitat.

1. Applicant's name ^: *(if additional persons require authorisation by this licence, please attach details of names and addresses)*	Chantelle Doyle Belinda Pellow	
2. Australian Business Number (ABN):	96 6091 554 64	
3. Organisation name and position of applicant ^: *(if applicable)*	AMBS Ecology and Heritage Pty Ltd C Doyle Botanist AMBS B. Pellow Director Flora AMBS	
4. Postal address ^:	1/33 Booth St Annandale NSW 2038	Telephone ^: [redacted]
5. Location of the action *(including grid reference and local government area and delineated on a map).*	The action will occur within the Hornsby Local Government Area [redacted]. The site coordinates are: [redacted] Propagation of specimens will occur at the Hornsby Shire Council Community Nursery, opposite Pennant Hills Park on Brittania St. Pennant Hills	

* A threatened species, population or ecological community means a species, population or ecological community identified in Schedule 1, 1A or Schedule 2 of the *Threatened Species Conservation Act 1995.*

^The personal details of all Section 91 licences will be displayed in the register of Section 91 licences required under Section 104 of the *Threatened Species Conservation Act 1995.* See notes.

	Figure 1. [redacted]
6. Full description of the action and its purpose *(e.g. environmental assessment, development, etc.)*	Staff from AMBS have had an association with this *Hibbertia spanantha* population since 2013, being responsible for its initial discovery, subsequent propagation program and ongoing monitoring. The initial propagation and population augmentation involved both *Epacris purpurascens* subsp*. purpurascens* and *Hibbertia spanantha*, which were planted in April 2015. Of these plants, all bar one *Epacris purpurascens* subsp. *purpurascens* survived, grew and flowered in the first year. The planted *Hibbertia spanantha* however, did not survive in the long term. Monitoring has provided some insights into the potential cause of these deaths, which AMBS in partnership with Hornsby Shire Council would like to continue exploring. At the time of planting the propagated *Hibbertia spanantha* were observed to have greater leaf biomass than plants in the local parent population (Plate 1) and it is surmised that fertilisation had a strong effect on above (and possibly below) ground biomass allocation. Whether or not soil nutrient status affects long term establishment is unknown. An initial soil analysis, conducted by the University of Sydney, showed potting mix had much higher nitrogen (ammonia, nitrate and nitrite) and phosphorus levels than in situ soils. Therefore, AMBS recommends trials to investigate the role of nutrients and fertilisation during propagation on the survival of individuals after in field planting. A brief search of scientific literature relating to the effect of nursery fertilisation on plant survival reveals varied results, however some studies have found that in circumstances of water deficit nitrogen hardening (or reduction) might improve survival (Trubat 2011, Trubat 2008). To our knowledge the effect of nursery fertilisation on in field *Hibbertia* survival has not been rigorously tested. To improve our knowledge of the role of nursery fertilization on in filed survival of the *Hibbertia* AMBS would like to undertake a trial using *Hibbertia spanantha* cuttings held at the Australian Botanic Gardens.. The aim of the trial will be to determine if fertiliser application during propagation plays a role in the survival of this species after in field

	planting. The results will be made public through the Australian Network for Plant Conservation and the Threatened Species Recovery Hub (www.nespthreatenedspecies.edu.au/) and will inform future population augmentation programs. As the need for threatened species population augmentation and translocation programs increase knowledge of successful or unsuccessful methods will be an important tool in guiding decision makers and plan designs. Trial Design Cuttings from each of the three accessions stored at the Australian Botanical Gardens will be acquired and used in four different treatments (high nutrient, medium nutrient, low nutrient and control). This will be achieved by using nursery base potting mix in a 50:50 ratio with acid washed sand or perlite. Fertiliser will be added in 2g, 5g, 10g quantities. Potting mix from the three treatments will be tested pre-planting by University of Sydney representatives to determine the nutrient profiles of each. Water and light during growth will be controlled as best possible by ensuring all plants are grown in the same nursery location. Plants will be grown and planted out in biodegradable forestry tubes as the roots of some *Hibbertia* species are sensitive to disturbance. While in the nursery propagated plants will be monitored monthly for changes in height and width, with descriptive characterises such as health, reproductive status and leaf colour and photos also being collected. All plants will be of the same age prior to planting. Planting age to be advised by nursery staff. Prior to planting all plants will be hardened off, through exposing them to sunlight and reduced water. Planting of a subset of propagated *Hibbertia spanantha*, ideally four from each treatment (a total of 16) will be undertaken in Autumn preferably in 2018. Maintenance of the plants will occur regularly (twice a week for the first fortnight, then weekly, then monthly) as required. All plants will be watered post planting with identical quantities of water. If possible soil will be collected at the time of planting and analysed by the University of Sydney to determine nutrient status. Soil from the planted specimens or from plants retained at the nursery may also be analysed for the presence of arbuscular mycorrhizal associations, which are believed to be present in the *Hibbertia* genus (Dr Tina Bell, USyd, Pers. Comms. 20th February 2017). Monitoring of planted *Hibbertia* will be ongoing for 3 years post planting and include measures of height, width and descriptive features such as evidence of reproduction, health and foliage colour. Monitoring will occurring weekly for the first month, monthly for the first year and then every 2 months for the remaining three years. Photos will be taken and the locations of all *Hibbertia* will be GPS’

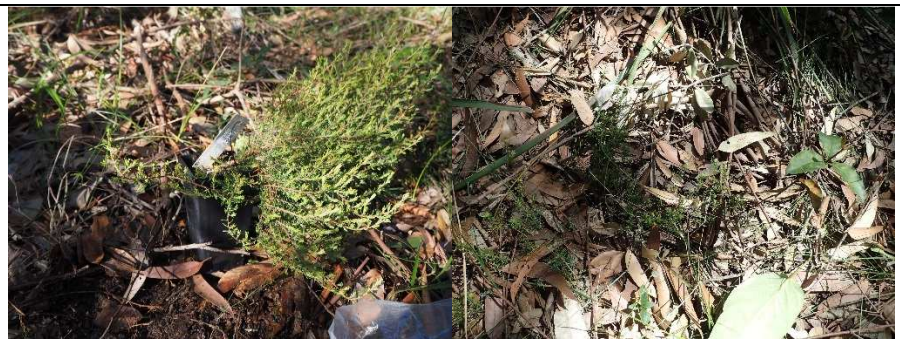

Plate 1 *Hibbertia spanantha* propagate plant at time of planting (left) and parent plant at time of peak growth during flowering 2016 (right). Note the propagated plant has visibly higher biomass.

7. Details of the area to be affected by the action *(in hectares)*.	Installation of *Hibbertia spanantha* will occur within the area designated in Figure 1. The area across which plants will be distributed is expected to cover, at most, two hectares of vegetation mapped as [redacted] Propagation of *Hibbertia spanantha* will occur at the Hornsby Shire community nursery.
8. Duration and timing of the action *(including staging, if any).*	Propagation of *Hibbertia spanantha* is anticipated to commence by mid 2017. Planting and follow up maintenance and monitoring of *Hibbertia spanantha* is expected to occur over a three year period, commencing ideally in autumn 2018 concluding in autumn 2021. Exact planting schedule will be dependent on maturity of propagated specimens.
9. Is the action to occur on land declared as critical habitat*? *(tick appropriate box)*	☐ Yes ☒ No

10. Threatened species, populations or ecological communities to be harmed or picked.	Scientific name	Common name *(if known)*	Conservation status *(i.e. critically endangered, endangered or vulnerable)*	Details of number of individual animals, or proportion and type of plant material *(e.g. fertile branchlets for herbarium specimens or whole plants or plant parts)*
	Hibbertia spanantha	Julian's Hibbertia	CE	Cuttings will be taken from plants already held by the

* Critical habitat means habitat declared as critical habitat under Part 3 of the *Threatened Species Conservation Act 1995*.

				Australian Botanical Gardens. No parent plants growing in-situ on the site will be disturbed.

11. Species impact: *(please tick appropriate box)* a) For action proposed on land declared as critical habtat or b) For action proposed on land not declared as critical habitat.	a species impact statement (SIS) is attached ☐ Yes ☒ No Items 12 to 25 have been addressed ☒ Yes ☐ No

N.B: Provision of a species impact statement is a statutory requirement of a licence application if the action is proposed on critical habitat.
The provision of information addressing items 12 to 17 is a statutory requirement of a licence application if the action proposed is **not** on land that is critical habitat. Information addressing any of the questions below must be attached to the application.

12. Describe the type and condition of habitats in and adjacent to the land to be affected by the action.	The project area is located in a strip of remnant bushland [redacted] The site is largely surrounded by residential development, but connects to [redacted]. The north eastern section adjacent to [redacted]. Outcropping sandstone characterises much of the project area which supports a well-developed vegetation community. The canopy is dominated by mature native trees, and there is a well-developed shrub and ground layer. In general, weeds are concentrated around the perimeter of the project area. Infestations are highest along the interface of the project area in areas of disturbance such as [redacted] A number of walking trails transect the project area and weeds are also found adjacent to these. A portion of the project area has been burnt sometime in the last7 years.
13. Provide details of any known records of a threatened species in the same or similar known habitats in the	*Hibbertia spanantha* is a newly discovered species, formerly described as *Hibbertia* sp. Turramurra. It is listed as occurring in only two other known location, the Turramurra area and Macquarie Park (Royal Botanic Gardens and Domain Trust 2017).

locality *(include reference sources).*	The confirmation of this species within the project area presents a population previously unknown until 2014, this population is now recorded on PlantNET (2017) as the Beecroft population. Staff of AMBS were formerly involved with the propagation and planting of individuals at the site in 2015, intended to augment the existing population. This was completed with the assistance of staff from the Royal Botanic Gardens, Mt Annan. No other population records exist, however potential habitat includes all clay sandstone influenced vegetation in the Sydney Basin (OEH 2016)
14. Provide details of any known or potential habitat for a threatened species on the land to be affected by the action *(include reference sources).*	A protected matter search (DotEE 2017) identified 46 threatened species records in the intended project area, including 28 fauna species which may occur in the area. A comprehensive threatened flora species search was conducted in the project area by Australian Museum Consulting in 2013 (Australian Museum Consulting 2013). The search identified one population of *Hibbertia spanantha* and one two populations of *Epacris purpurascens* subsp. *purpurascens.* Two additional *Hibbertia spanantha* have also been identified outside the initial population boundary. No additional threatened flora species were located within areas of potential habitat. A pre-clearance survey undertaken in 2013 (Australian Museum Consulting 2013) positively identified 28 fauna species. This included six species of mammal and 22 species of bird. One additional bat species has also been identified as "probable" based on call analysis. Remains of what was possibly a Powerful Owl prey item were detected. The Powerful Owl is listed as 'vulnerable' under the TSC Act. One of the microbat species detected by ultrasonic call recording, the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), is also listed as 'vulnerable' under the TSC Act. No microbats were observed [redacted]. No habitat for Cumberland Plain Land Snails was present and none were detected. The intended activities will not impact the habitat of any recorded threatened species and intend to augment the existing population of a critically endangered species.
15. Provide details of the amount of such habitat to be affected by the action proposed in relation to the known distribution of the species and its habitat in the locality.	The intended activities will occur [redacted] (Figure 1). Impact to this habitat will be minor, limited to digging of holes required to install the propagated plants. Some minor disturbance to the bushland habitat may occur as a result of walking to and from the planting sites. [redacted]. The location of these plants is known to staff of AMBS and Hornsby Council. The plants will not be impacted by the proposed works.

16. Provide an assessment of the likely nature and intensity of the effect of the action on the lifecycle and habitat of the species.	The installation of propagated plants will ideally occur in autumn. This period corresponds with a slowing in the active growth of many native plant species, including *Hibbertia spanantha* which flowers in Spring (OEH 2014). Plantings of these species during autumn will reduce transplant shock and provide a period of approximately six months for establishment, before summer heat stress occurs. The period also correlates with the highest rainfall (BOM 2017), which will contribute to plant establishment success. This activity is assessed to have minimal impact on the life cycle of the species. The impact to the habitat of the species and additional species in the area will also be minimal. Disturbance will be limited to digging of holes and site visitation to maintain and monitor plants. In addition, the propagation and monitoring of nursery plants under different nutrient treatments may identify important species information for future propagation and planting programs, along with provide an opportunity for locally maintained parent stock. The cause of death for the first planted *Hibbertia spanantha* is unknown but may have been a combination of factors including depletion of nutrient reserves, root shock or water stress. Although *Hibbertia* are sensitive to disease in particular the root rot *Phytophthora cinnamomi (*ANBG 2015, OEH 2016*)*, this was not the cause of their death as the roots we noted to be intact in all dead plants. Propagation and subsequent planting and monitoring may determine which factors contribute to the plant survival. Further, the parent population [redacted] has flowered, but has not been recorded to set seed/produce progeny. Maintenance of a small parent population in the Hornsby nursery may offer opportunities to understand drivers of pollination or seed set.
17. Provide details of possible measures to avoid or ameliorate the effect of the action.	To limit potential damage to the in-situ parent population, cuttings from the three parent accessions held at Australian Botanical Garden will be obtained. Hibbertia generally propagate well from cuttings, which should be collected once new growth has begun to harden off (ANBG 2017, Ross Rapmund Hornsby nursery manager pers. comms 26th Feb 2017, Margaret Hamilton Australian Plant Society Pers. comms 16th January). It is anticipated cuttings will only need to be collected once. With regard to planting. Individuals will be installed in similar habitat to the parent population. In order to limit damage or attrition, plants will be: • installed in areas with no weed competition; • installed in areas far removed from human traffic or at low risk of inadvertent trampling; • spread strategically throughout the proposed planting area; • maintained with supplementary water for three month post planting; and

	• monitored and maintained regularly over a 3 year period to limit damage and facilitate establishment.

N.B: The Chief Executive must determine whether the action proposed is likely to significantly affect threatened species, populations or ecological communities, or their habitats. To enable this assessment, the Applicant is required to address items 18 to 24. Any additional information referred to in addressing these items must be attached to the application.

18. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	The intended activities will not impact the existing local populations as the plant material to be introduced are propagules taken as cuttings from adult plants within the project area. No new genetic material will be introduced to the population as a result of this action. Therefore, the life cycle of the mature specimens is not expected to be adversely affected by this action. The current population has not been observed to set fruit or reproduce, therefore the long-term viability of the population is unknown. The aim of the proposal is to increase the viability of the local population through population augmentation and to understand best practice for population augmentation works. It is hoped that in the long term the reproductive mechanisms of this species will be understood and the population can become self-sustaining.
19. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.	The relevant threatened species at this location are not listed as Endangered Populations. This species is however listed as a Site Managed Species under the Saving Our Species program.
20. In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable.

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	
21. In relation to the habitat of a threatened species, population or ecological community: (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	The proposed works intend to use cuttings from parent plants already stored at Mt Annan Botanic Garden. This will negate any direct impact on the local population. *Hibbertia* are generally known as agenera which propagate well from cuttings of mature woody material. The disturbance relating to planting of propagated specimens will be limited to initial site inspections, digging of holes to install plants and subsequent maintenance and monitoring. (i) The intended activities will not remove or modify the habitat of a threatened species or community. (ii) The intended activities will not fragment or isolate existing populations. (iii) No habitat will be removed, modified or isolated.
22. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).	Critical habitat has not been declared for this species
23. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.	No recovery plan has been developed for *Hibbertia spanantha* Activities to assist the species, as described by OEH (2016) include: • Landholder liaison. • Maintenance of the fencing which currently protects part of the population. • Habitat management: Weed control.

	• Install fencing to protect populations from physical disturbance. • Appropriate fire management. • Increase connectivity and habitat value between individuals. • Close and remediate informal access. • Monitoring • Survey and/or mapping. • Captive husbandry or ex-situ collection/propagation The intended activities directly address two of the above criteria; Landholder liaison- through collaboration with Hornsby Shire Council) Captive husbandry- through propagation and maintenance of a parent population, in addition to the Mt Annan propagules. In additional the project will: Monitor- the success of propagation under a series of nutrient treatments and then attempt to correlate with establishment success through monitoring plant survival post planting for a period of three years. Conduct mapping- of all new planted species. The monitoring program will be developed into a case study which can inform future population expansion activities.
24. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	Key threatening processes (TSC 1995) relevant to *Hibbertia spanantha* may include: • Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; • Invasion of native plant communities by exotic perennial grasses; • Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *Cuspidata*; • Invasion, establishment and spread of *Lantana camara;* • Invasion and establishment of exotic vines and scramblers; and • Infection of native plants by *Phytophthora cinnamomi.* Additional threats to the known populations of *Hibbertia spanantha* (OEH 2016) which may be relevant to the intended works include: • Highly restricted geographical distribution, and only a small number of mature individuals known from three locations. • The populations are within and adjacent to areas used for recreation, bike riding and dog walking. Trampling of plants may occur and compaction of the soil may affect drainage. • Competition and changes to soil and microclimate with weed invasion. • Possible susceptibility to Phytophthora (*Phytophthora cinnamomi).* The susceptibility of NSW species is poorly known, but a number of eastern Australian members of the genus are known to be susceptible.

	• Infrastructure maintenance within close proximity to the plants. • Competition with native plants including *Acacia* spp., *Cassytha glabella* and *Pittosporum undulatum.* The populations of *Hibbertia spanantha* will not be directly impacted by the intended activities, however the threats described above will be considered when undertaking the planting activities. Off track access to the planting sites will be kept to a minimum, the number of individuals accessing the planting areas will be kept to a minimum, plants will be marked before revisiting the site to avoid inadvertent trampling, the area will be maintained to manage weeds post planting and all shoes, tools and equipment will be disinfected to reduce the threat of Phytophthora introduction. During maintenance activities, particular attention will be paid to removing exotic vines and scramblers.

Important information for the applicant

Processing times and fees

The *Threatened Species Conservation Act 1995* provides that the Chief Executive must make a decision on the licence application within 120 days where a species impact statement (SIS) has been received. No timeframes have been set for those applications which do not require a SIS. The Chief Executive will assess your application as soon as possible. You can assist this process by providing clear and concise information in your application.

Applicants may be charged a processing fee. The Chief Executive is required to advise prospective applicants of the maximum fee payable before the licence application is lodged. Therefore, prospective applicants should contact the Office of Environment and Heritage (OEH) prior to submitting a licence application.

A $30 licence application fee must accompany a licence application.

Protected fauna and protected native plants*

Licensing provisions for protected fauna and protected native plants are contained within the *National Parks and Wildlife Act 1974.* However, a Section 91 Licence may be extended to include protected fauna and protected native plants when these will be affected by the action.

If you are applying for a licence to cover both threatened and protected species please provide the information requested in Item 10 *as well as* a list of protected species and details of the number of individuals animals or proportion and type of plant material which are likely to be harmed or picked.

Request for additional information

The Chief Executive may, after receiving the application, request additional information necessary for the determination of the licence application.

* Protected fauna means fauna of a species not named in Schedule 11 of the *National Parks and Wildlife Act 1974.*
Protected native plant means a native plant of a species named in Schedule 13 of the *National Parks and Wildlife Service 1974.*

Species impact statement

Where the application is not accompanied by a species impact statement (SIS), the Chief Executive may decide, following an initial assessment of your application, that the action proposed is likely to have a significant effect on threatened species, populations or ecological communities, or their habitats. In such cases, the *Threatened Species Conservation Act 1995* requires that the applicant submit a SIS. Following initial review of the application, the Chief Executive will advise the applicant of the need to prepare a SIS.

Chief Executive's requirements for a species impact statement

Prior to the preparation of a SIS, a request for Chief Executive's requirements must be forwarded to the relevant OEH Office. The SIS must be prepared in accordance with section 109 and 110 of the TSC Act and must comply with any requirements notified by the Chief Executive of Office of Environment and Heritage (OEH).

Disclosure of Personal Information in the Public Register of s91 Licences

The Public Register provides a list of licence applications and licences granted. A person about whom personal information is contained in a public register may request that the information is removed or not placed on the register as publicly available.

Copies of all applications and licences issued under section 91 and certificates issued under section 95 of the Act are available on the OEH website at Public register of section 91 applications, licences and certificates or in hardcopy form from The Librarian, Office of Environment and Heritage, 59 Goulburn St, Sydney.

Certificates

If the Chief Executive decides, following an assessment of your application, that the proposed action is not likely to significantly affect threatened species, populations or ecological communities, or their habitats, a Section 91 Licence is not required and the Chief Executive must, as soon as practicable after making the determination, issue the applicant with a certificate to that effect.

N.B: An action that is not required to be licensed under the *Threatened Species Conservation Act 1995*, may require licensing under the *National Parks and Wildlife Act 1974*, if it is likely to affect protected fauna or protected native plants.

I confirm that the information contained in this application is correct. I hereby apply for a licence under the provisions of Section 91 of the *Threatened Species Conservation Act 1995.*

Chantelle Doyle

Applicant's name
(Please print)

Ecologist

Applicant's position and organisation *(if relevant)*
(Please print)

Applicant's signature

02/03/2017

Date

For more information or to lodge this form, contact the nearest branch of OEH's Regional Operations Group:

Greater Sydney
PO Box 644
Parramatta NSW 2124
Phone: 02 9995 5000
Email: gs.complianceregulation@environment.nsw.gov.au

Hunter and Central Coast
PO Box 1002
Dangar NSW 2309
Phone: 02 6651 5946

Illawarra
PO Box 513
Wollongong NSW 2500
Phone: 02 4224 4150

North east
24 Moonee Street
Coffs Harbour NSW 2450
Phone: 02 6651 5946

North west
PO Box 2111
Dubbo NSW 2830
Phone: 02 6883 5300

South east
PO Box 733
Queanbeyan NSW 2620
Phone: 02 6229 7188

South west
PO Box 544
Albury NSW 2640
Phone: 02 6022 0600

Office of Environment and Heritage (NSW)
PO Box A290, Sydney South NSW 1232
Phone: 131 555 (Environment Line) Fax: 9995 5999
Email: info@environment.nsw.gov.au

April 2016
OEH 2016/0239

References

Australian Museum Consulting (2013) North West Rail Link TSC Works Pre-clearance Survey [redacted]. Consultancy report to Thiess John Holland Dragados.

ANBG (2015) Growing Native Plants *Hibbertia pedunculata website* https://www.anbg.gov.au/gnp/gnp11/hibbertia-pedunculata.html accessed February 20217

BOM (2017). Climate data online Australian Bureau of Meteorology. Website http://www.bom.gov.au/climate/data/. Accessed February 2017

DotE (2017). EPBC Protected Matters Search Tool Department of the Environment and Energy Website http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf Accessed February 2017

OEH (2016). Threatened Species Profile. Julian's Hibbertia Website: http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20279 Accessed February 2017

Royal Botanic Gardens and Domain Trust (2017). PlantNET - The Plant Information Network System of The Royal Botanic Gardens and Domain Trust, Sydney, Australia. http://plantnet.rbgsyd.nsw.gov.au Accessed February 2017.

Roman Trubat, Jordi Cortina, Alberto Vilagrosaa (2011) Nutrient deprivation improves field performance of woody seedlings in a degraded semi-arid shrubland Ecological Engineering37: 8, pp 1164–1173

Roman Trubat, Jordi Cortina, Alberto Vilagrosa (2008) Short-term nitrogen deprivation increases field performance in nursery seedlings of Mediterranean woody species Journal of Arid Environments 72: 6 pp 879–890