Species Management Plan

Rusty Plum
Niemeyera whitei

Prepared: 16th March 2020

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INTRODUCTION

Rusty Plum, *Niemeyera whitei,* is listed in the Coastal IFOA (2018) as a species protected by the application of Species Management Plan. The species was the subject of a Flora monitoring plan for the previous IFOA, for which monitoring was undertaken and a report completed. It remained unclear following this program about the extent of the populations within the reserved areas within State Forests and the National Park estate.

SAVING OUR SPECIES STATUS

Rusty Plum has been assigned to the Keep-watch species management stream within the 'Saving our Species' program. This refers to an assessment that the species is predicted to be secure in NSW for 100 years without targeted site-based management.

2019/2020 Fires

In the 2019/20 fire season substantial areas of public and private forests were affected by fire. Forestry Operations are proposed under site-specific conditions that include a requirement to take account of the impact of the fires on flora species managed under SMPs. This plan includes a consideration of the impact of fires on the Rusty Plum population and includes measures to review the species response to those wildfires.

OBJECTIVES

The previous monitoring program identified that Rusty Plum has some ability to recover from both harvesting activities and fire, but there was limited information on the response to more intensive harvesting and severe fire, or on the extent of populations within the reserved network. The objectives of this Species management plan are:

- To identify 30 *Rusty Plum SMP Exclusion Zones* sites across the species distribution that occur in the harvest area and protect these from both harvesting and post-harvest burning
- to obtain a quantitative estimate of the proportion of individuals within the reserved network within State Forests, and within National Parks;
- to identify core reproductive populations within the broader population;
- Undertake monitoring to obtain a quantitative estimate of the proportion of individuals of *N. whitei* in the net harvest area which are killed, the proportion damaged by harvesting and post-harvest burning and the types and extent of damage sustained and to assess the extent to which damaged individuals recover vegetatively from different types and extent of damage.
- To assess Rusty Plum recovery in wildfire affected areas.

In addition to these listed conservation objectives, the use of the wildlife habitat clump and tree retention clumps provisions within the coastal IFOA (Protocol 22) are expected to protect additional individuals and populations of *N. whitei* within operational areas from ***forestry operations*** where these can also meet the other selection criteria and objectives listed in Protocol 22 for clumps.

COMMENCEMENT DATE

The program of management, monitoring and targeted survey will commence in March 2020.

DISTRIBUTION AND ABUNDANCE

N. whitei occurs in coastal and subcoastal areas from Kempsey to S. Qld. There is a disjunction in the lower Clarence valley, between just north of Woolgoolga and Copmanhurst. The species is locally common to abundant in suitable habitat throughout the southern part of its range, where it is sometimes the most common understorey tree. It is less common in the north. This species management plan applies only to the population in the southern part of the range, south of Grafton.

ECOLOGY AND BIOLOGY

The pattern of occurrence at a site is typically closely correlated with the toposequence. The highest density of individuals, and the largest individuals, occur in or near gullies, with density and size decreasing upslope. It is usually absent from ridges and upper slopes. This pattern is probably related to fire effects, with plants establishing less frequently in areas of higher fire frequency.

The species is a long-lived tree, growing up to 25 m high and reaching a stem diameter of 80 cm. Its longevity is probably at least several hundred years. Larger plants appear to have some degree of fire resistance but may be killed in occasional high intensity fires. Casual observations suggest that individuals are moderately resilient to mechanical damage. The seeds are large, fleshy drupes. They are probably too large to be dispersed intact by most frugivores, but brush turkeys may be a dispersal agent. Otherwise, they may be dispersed slowly uphill by rats or possums carrying partially eaten fruits, since casual observations suggest that at least some damaged fruits may germinate. They would disperse slowly downhill by gravity.

The observed size distribution suggests that recruitment may occur whenever suitable conditions of temperature and moisture occur following fruiting and there is no evidence of episodic recruitment. Smaller trees occur as an understorey in dense forest and there is no indication that canopy removal or ground disturbance is necessary for recruitment.

CONSERVATION AND FOREST MANAGEMENT ISSUES

Current FCNSW forest management zones protect a large proportion of mature individuals within exclusion zones. Limited data are available, but it is estimated that at least 70% of mature trees in a compartment are protected in this manner. This combined with the extent of stands reserved formally (National Parks, Nature Reserves, Flora Reserves) and informally (riparian exclusion zones and other areas in State Forest excluded from harvesting by management prescription), indicates that logging will only affect a very small proportion of the total population (estimated at <10%) and that the affects will be widely dispersed in space and time. Further, it is predicted that no more than 30% of individuals within the net harvest area will be directly affected by harvesting, and that a substantial proportion of damaged individuals will recover vegetatively.

Harvesting is predicted to be neutral or possibly reduce recruitment in the short term (1-2 years), on the basis that there is no evidence of enhanced recruitment in recently disturbed sites. Otherwise, since there generally appears to be a low level of continuous recruitment, it is assumed that immediate effects on existing plants are the most significant impact of harvesting. The largest trees, occurring in riparian zones, are likely to be the most prolific seed producers and trees subject to possible harvesting damage are likely to contribute relatively little to overall seed production. It is assumed that

recruitment will slowly progress upslope from the main seed source in protected riparian zones, but it is not necessarily assumed that the level of recruitment will be sufficient, in the short term, to replace mature individuals killed or destroyed during logging.

In the areas of occurrence of *N. whitei*, harvesting includes a combination of selective harvesting and intensive harvesting, in a mosaic in one operational area. Post-harvest burning is often conducted if weather conditions allow but is patchy and doesn't affect the whole compartment. On average, about 30% of the net harvest area is directly affected by the operation (i.e. including soil disturbance and canopy removal). The priority for monitoring is to quantify the short term (ca. 1 year) impact on trees in the net harvest area, as a result of these operations. Trees may be left undamaged or may suffer mechanical damage to the crown or stem or may be uprooted partially or entirely. Mechanical damage may be caused directly by machinery or by tree crowns falling into *N. whitei* individuals. Post-harvest burning is usually confined to heaps of harvesting debris, especially felled tree crowns. A proportion of mechanically damaged *N. whitei* may be further damaged by burning. However, undamaged individuals are less likely to be burnt, since they will usually occur in less disturbed patches which are rarely burnt.

Harvested areas will be harvested again on a cycle of 10-15 years. In the longer term, the cumulative impacts of repeated harvesting are important. Conditional on the short-term results from this plan, to be reviewed in two years (see below under Review), other aspects such as cumulative impacts and recruitment rates may be monitored.

The Flora expert panel identified that source populations are in rainforest and riparian areas and are likely adequately protected but that upper slopes may be sensitive to fires. Mapping and protection of a selection of populations as an additional protection measure under an SMP approach is proposed.

2019/2020 Wildfires
The distribution of *N. whitei* records and the 2019/20 fires are shown in the map in Appendix 1. Of the 1401 records, 35 (2.5%) were inside the mapped burn perimeter of the 2019/20 wildfires.

REQUIREMENTS

1. Distribution Surveys:

Surveys for *N. whitei* will be undertaken during pre-operational surveys targeting potential habitat in operational areas at a minimum rate of 1km/hr. Individuals and populations of *N. whitei* recorded during pre-operational surveys will be used to determine the extent of the broader population of *N. whitei,* as well as core populations.

Reserved areas adjacent to operational areas will be searched during targeted flora surveys with broader surveys undertaken within the National Park estate undertaken opportunistically, within proximity of known records in consultation with NPWS area managers and SOS coordinator.

The occurrence and an estimate of population size of *N. whitei* will be recorded for this species during all comprehensive pre-operational and reserve area surveys in areas of potential habitat within each operational area triggered by a record. The method of estimating population size for larger populations will be recorded.

These targeted surveys will be conducted at a consistent rate of 1 km per hour to allow comparisons of detection rates and likely population sizes by habitat type, tenure and potential harvest status to

help determine the likely proportion of the population that is protected in both reserves and State forest protection measures under the CIFOA.

2. SMP Exclusion Zones

2.1 SMP Exclusion Zones - Selection and Protection:

a) 30 *Rusty Plum SMP Exclusion Zones* must be identified as exclusion zones by March 2023.

b) *Rusty Plum SMP Exclusion Zones* must be a minimum of 1 ha of base net area in size.

c) *Rusty Plum SMP Exclusion Zones* should be designed to connect to populations that include mature individuals in adjacent rainforest or drainage line areas.

d) *Rusty Plum SMP Exclusion Zones* must be spread across the geographic range of Rusty Plum within the SMP area.

e) *Rusty Plum SMP Exclusion Zones* must be mapped and recorded in the Flora_SMP_Exclusion dataset.

f) *Rusty Plum SMP Exclusion Zones* less than 2 ha in size are a Category 1 ESA.

g) *Rusty Plum SMP Exclusion Zones* 2 hectares or larger are a category 2 ESA.

h) *Rusty Plum SMP Exclusion Zones* may contribute to Wildlife Habitat Clumps where this is consistent with the requirements of Protocol 22.

Rusty Plum SMP Exclusion Zones are intended to capture larger populations of Rusty Plum that include mature reproductive individuals that occur in the net harvest area and connect to populations protected in rainforest and drainage line areas.   Rusty Plum exclusion zones should include a minimum of 20 Rusty Plum plants and preferably include at least 1 large (>25 cm dbh) individuals.

Rusty Plum SMP Exclusion Zones will be selected from a combination of existing records and populations identified during targeted surveys in the first 3 years of the plan that are consistent with the aim of covering the species distribution and including large populations of mature trees that occur in the net harvest area.

2.2 Other Flora SMP species Records

a) Records of Rusty Plum outside of *Rusty Plum SMP Exclusion Zones* do not require site-specific protection.

b) Notwithstanding 2.2 a), records may be included in wildlife habitat clumps and tree retention clumps where this is consistent with the requirements of Protocol 22.

3. Monitoring:

This species was previously monitored (Flora Monitoring Plan) under the previous Integrated Forestry Operating Approvals (IFOA) with three sites established in the Coffs Harbour area. These sites were not established for permanent and ongoing monitoring but will be re-located and reassessed to identify, as far as practical, the survival of those individuals in the longer term. The results of these reassessments will be reported at the first annual review meeting.

Three study sites will be selected over a period of three years, one site being established approximately annually. Where possible sites should be located where intensive harvesting is intended to be applied in the near future and these must include at least two of the three sites. At each site, a minimum of twenty trees of *N. whitei* will be selected and tagged with uniquely-numbered metal tags. A smaller number may be selected where it is impractical to locate 20 trees, due to a very low density of trees in the net harvest area.

At each study site, four 20 x 20 m plots will be established that represent the spatial extent of the distribution of *N. whitei* within the study area and ideally include at least one mature tree. The centre of each plot will be marked and an average GPS location for the plot tree will be recorded. Within each plot at least 5 trees (if available) will be individually tagged and be assessed before and after harvesting, as described below. Sample trees should be randomly chosen and should be at least 5 m apart. As far as practicable, trees will be selected from the range of size classes in the net harvest area. Tree location will be recorded using the FCNSW Map App on an IPAD and details including; distance and bearing from the centre point to facilitate re-location.

Location of study sites:

The monitoring site for the first year is the group of compartments 8_9_10_12_13_14 in Lower Bucca SF and compartment 1 Orara East SF where *N. whitei* is sufficiently common in the net harvest area. Study sites for years 2 and 3 will be chosen from other parts of the range.

Factors measured and measurement frequency:
Trees will be measured prior to harvesting (within six months), immediately post-disturbance (within one month of harvesting, or within one month of post-harvest burning if burning is conducted) and at nominally 1-3 years (at least 1 year should be allowed, to ensure any vegetative recovery is sustained). Harvesting intensity at each plot will be recorded.

Factors measured on each occasion are as follows:
- Initial (pre-harvest) measure - height, stem girth and crown condition (coded as poor, moderate or good – refer to Appendix 2) of tagged trees; number of additional trees within 5 m radius in four size classes (<2 m high, 2 m high – 5 cm dbhob, 5-10 cm dbhob, > 10 cm dbhob).
- Immediately post-harvesting - type and extent of harvesting damage, coded as indicated in the attached sheet (Appendix 2). In addition, any new seedlings appearing post-harvesting g, within 5 m of the tagged tree, will be counted.
- One-year post-harvesting - height, stem girth and crown condition will be re-assessed and type and extent, if any, of vegetative recovery recorded for any damaged plants. Vegetative recovery will be coded as indicated in appendix 2. The number of additional, untagged trees within 5 m radius will be counted in four size classes as for the pre-harvest measure. In addition, the number of such trees which are judged to be seedlings which have appeared post-disturbance, will be recorded.

4. Post-fire Recovery Assessment

5 existing record sites will be selected that represent sites with a range of fire intensity if available to assess response to wildfires. Sites that local ecologists are confident they can relocate will be selected. As sites do not have accurate pre-fire population estimates sites will be visually assessed for response to determine if live plants can be located and assess their fire response. Sites will be assessed in 2020 prior to scheduled November annual review meeting. Pending results of 2020 surveys may be repeated in 2021 and beyond.

IMPLEMENTATION TIMETABLE

		2020	2021	2022	2023	2024	
Task	Proposed Commencement Date	Plot re-measure	Plot re-measure	Plot re-measure	Plot re-measure		Notes
SMP approval	March 2020						
Rusty Plum SMP Exclusion Zone site selection							
Site-selection		Identify sites	Identify sites	Identify sites			
Monitoring Surveys							
Survey of reserved patches and NPWS estate		Dec 2020-Oct 2021	Ongoing	Ongoing			
Establishment and measure of first site		Mar/April 2020	Feb-Mar 2021	Feb-Mar 2022			Harvesting schedule dependent
Establishment and measurement of second new site		Jun/July 2020	Jun/July 2021	Jun/July 2022			Harvesting schedule dependent
Establishment and measurement of third new site			Jun/July 2021	Jun/July 2022	Jun/July 2023		Harvesting schedule dependent
Results summarise and compilation		Sept-Oct 2020	Sept-Oct 2021	Sept-Oct 2022	Sept-Oct 2023		
Review Meeting		Nov-20	Nov-21	Nov-22	Nov-23	Mar/Apr 2024	
Previous Monitoring Site Assessment							
Reassessment of previous monitoring sites		Nov 2020					
Wildfire Recovery Assessment							
Survey of sites in wildfire affected areas		Nov 2020 – Initial results	Report Oct 2021				

NOTE: the timing of the commencement of plot establishment will be dependent on the harvesting schedule and locating adequate populations, so the above proposed time frames may vary.

REVIEW

Following compilation of the survey results, plot implementation and re-measure of the previous monitoring plots a review of the information will be undertaken in November 2020 with subsequent review meetings proposed annually for this and other species managed by the Species Management Plan stream. This will be undertaken to assess progress on listed aims and proposed timeframes of completion.

MANAGEMENT IMPLICATIONS

The results of this program will inform whether *N. whitei* is adequately represented in the reserved network, including formal and informal reserved areas in State Forests and the National Park estate. The results of the above listed assessment of populations in the reserved network, combined with

results of monitoring individuals within the 'net harvest area', providing an understanding of the species' response to disturbance, ie vegetative recovery and recruitment. This will complement the new significant site exclusion zones protection measures which are additional to measures applied under the previous IFOAs.

Appendix 1. Map of records of *Niemeyera whitei* in the southern distribution and SMP Area
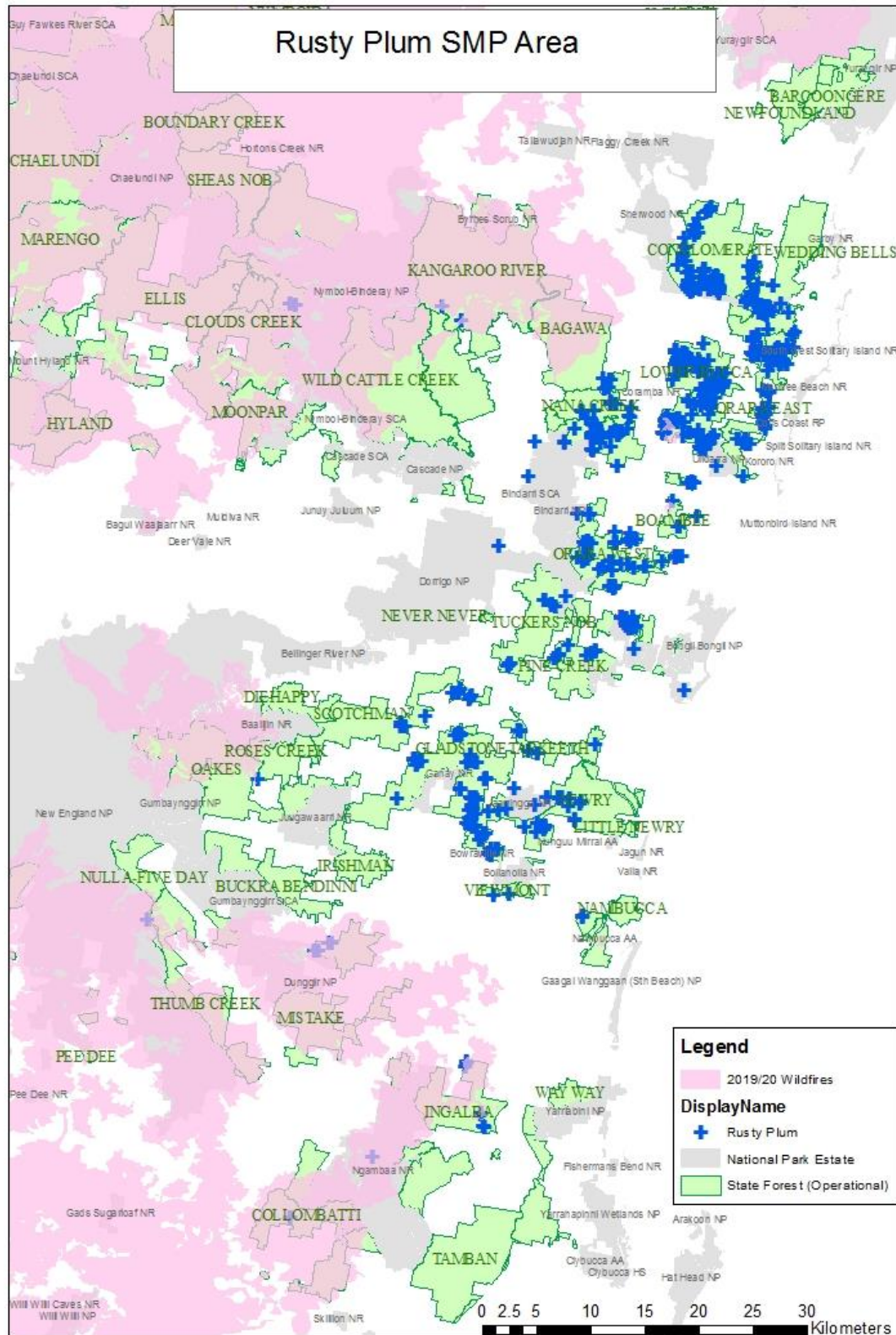
Appendix 2. Assessment codes for damage and recovery

Harvesting Damage

Assessed as a two-digit code (multiple codes may be used for a single tree if there are several types of damage):

First digit = type of damage	Second digit = extent of damage
0 = undamaged	always 0
1 = crown or branch damage	1 = < 1/3 of original crown volume destroyed 2 = 1/3-2/3 of original crown volume destroyed 3 = >2/3 of original crown volume destroyed
2 = bark damage on stems, with exposed cambium	1 = minor 2 = significant damage affecting up to ½ circumference 3 = significant damage affecting over ½ circumference
3 = stem or trunk breaks	1 = < ½ of stem cross-sectional area broken 2 = > ½ of stem cross-sectional area broken, but not severed 3 = stem severed
4 = leaning or bent, but not broken, stem	1 = <45° from vertical 2 = >45° from vertical 3 = prostrate
5 = root disturbance	1 = < ½ root ball affected 2 = > ½ root ball affected 3 = completely uprooted
6 = destroyed, no remaining evidence	always 0

Recovery Codes

First character (type):   A = crown or branch regrowth
    B = stem epicormics
    C = coppice from stem at or near ground level
    D = root suckers

Second character (vigor):   1 = vigorous
    2 = moderate
    3 = weak

Crown condition

Good   Most of crown intact and most (>70%) of potential crown volume occupied by live branches; low proportion of dead twigs or branches; most outer twigs leafy.

Moderate   At least 30% of crown intact and at least 30% of potential volume occupied by live branches; at least some dead branches or twigs in upper crown.

Poor   Less than 30% of crown intact or numerous dead or leafless branches or twigs.

Appendix 3. Example survey form

SMP FLORA SURVEY – CIFOA REGION	OFFICE USE ONLY	
Forestry Corporation	Survey name/ no.	
	Entry date	

STATE FOREST		M.A.		PLANNING AREA (S)	
				SURVEY CPT.	

PLOT NUMBER		LOCATION DESCRIPTION		

DATUM	AMG COORDINATES	Easting		AREA TYPE	
GDA94		Northing		□ Net Harvest Area □ Exclusion Area	

BROAD HABITAT TYPE								
FOREST TYPE NUMBER(S)	Rainforest			Sclerophyll			Woodland	
	□ Subtropical □ Dry □ Temperate			□ Wet	□ Dry	□ Swamp	□ Shrub □ Heath □ Tall	

OBSERVER(S)		TARGET SPECIES:	
DATE			
START TIME (24hr Format)			
FINISH TIME (24hr Format)			
TOTAL TIME			

Tree No.	Species	Distance (m)	Bearing	Height (m)	Plant Condition	Age Class	Comments
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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