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1 **The Tasmanian Thylacine Sighting Record Database (TTSRD): 1,223 quality-rated**
2 **and geo-located Thylacine observations from 1910 to 2019**

3

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14 **Abstract**

15 The Thylacine or ‘Tasmanian tiger’ (*Thylacinus cynocephalus*), an iconic canid-like marsupial predator
16 and last member of its taxonomic family (Thylacinidae) to have survived to modern times, was declared
17 officially extinct in the early 1980s, half a century after the death of the last captive animal. However,
18 the regularity and frequency of sightings of the species over more than eight decades since has not only
19 created a zoological mystery, but also made it challenging to reconstruct the timeline of the fate of the
20 species. To help resolve this intriguing historical-ecological problem, we compiled and curated a
21 comprehensive inventory of documented sighting records from Tasmania from 1910 to 2019. By
22 examining sources spanning official archives, published reports, museum collections, newspaper articles,
23 microfilm, contemporary correspondence, private collections and other miscellaneous citations and
24 testimony, we have amassed 1,223 unique Thylacine records from this period and resolved previous
25 anomalies and duplications. Each observation in the database is dated, geo-tagged, categorised, quality-
26 rated, referenced and linked to an image of its source material. Although purported observations have
27 occurred every year, reporting rates vary across the decades in terms of frequency, type, location, and
28 quality rating. Here we describe the database in detail, highlight its value for research, interpret the major
29 patterns revealed by this archival compilation, and discuss the broader implications of the result of this
30 work on the likely time and place of the Thylacine’s extinction in the wild.

31

32 **Key Words:** *Thylacinus cynocephalus*, Tasmanian tiger, historical records, archive, sightings,
33 uncertainty, extinction.

34 **Introduction**

35 The Thylacine or ‘Tasmanian tiger’ (*Thylacinus cynocephalus*) is the largest marsupial carnivore to have
36 survived into modern times (as illustrated in Fig. 1). The last captive specimen died at the Hobart Zoo in
37 the Queen’s Domain on the night of the 7th September 1936¹. This is widely accepted as the extinction
38 date for the species, and now marks the annual National Threatened Species Day (formerly *National*
39 *Thylacine Day*) in Australia. The authoritative consensus on the present-day status of the Thylacine is
40 that it is extinct. The species is listed as such under the Environment Protection and Biodiversity
41 Conservation Act 1999 (EPBC Act), and under the International Union for Conservation of Nature
42 (IUCN) Red List 2012 (McKnight 2008). In March 2013, the Thylacine was delisted from CITES
43 Appendix I (species threatened with extinction) in accordance with Resolution Conf. 9.24 (Rev. CoP15).
44 Yet apparently credible sightings are persistently reported, through to the first decades of the current
45 century, and recent formal statistical modelling suggests the likely persistence of the species for many
46 decades after the final captive animal died (Brook *et al.* 2023). How then can the formal status of the
47 species be reconciled with these observations?

48

49 **Extinct or Extant? Ambivalent scientific opinion**

50 Bailey (2019) states: “*The age of certainty ended with the death of the world’s last known captive*
51 *Thylacine, and almost at once, the era of improbability commenced*”. The survival of the Thylacine
52 beyond the death of the last captive specimen is both emotive and perplexing, with opinion divided
53 between those who believe the species is now extinct and those who are convinced of its continued
54 survival in the remote wilderness of the island of Tasmania. Even scientific authorities appear to hedge
55 their bets, with use of the terms “probably” or “possibly” extinct. The Tasmanian Parks & Wildlife
56 Service (PWS)² states: “*The Thylacine is the only mammal to have (possibly) become extinct in Tasmania*
57 *since European settlement*”. They continue: “*Nonetheless, the incidence of sightings introduces a*
58 *reluctance among some authorities to make emphatic statements on the status of the species. Even if*
59 *there did exist a few remaining individuals, it is unlikely that such a tiny population would be able to*
60 *maintain a sufficient genetic diversity to allow for the viable perpetuation of the species in the long-*
61 *term*”. The Australian Museum website³ also uses the somewhat guarded term “*now believed to be*

¹ Hobart City Council Reserves Committee, dated 16/9/1936, point 10.

² <https://www.parks.tas.gov.au/?base=4765> (accessed 30/3/2019).

³ <https://australianmuseum.net.au/learn/australia-over-time/extinct-animals/the-Thylacine/> (accessed 30/3/2019).

62 *extinct*”, rather than extinct. As recently as 2012, the European Commission’s legislation⁴ on the
63 protection of species and wild fauna lists the Thylacine as “possibly” extinct. The National Museum of
64 Australia (2019) states: “*Thylacines are functionally extinct which means that any remaining population*
65 *is so small that the species no longer plays a significant role in the ecosystem*”. The absence of scientific
66 consensus naturally adds uncertainty to the debate over extinction versus survival.



67
68 **Figure 1.** Artists’ impressions of two events in the decline of the Thylacine. Top: the famous sighting
69 by NPWS officer Hans Naarding in 1982 [painted by, and reproduced with permission from, Bill

⁴ Commission Regulation (EU) No 1158/2012 of 27/11/2012 amending Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein.

70 Flowers]. Bottom: *'the last Thylacine'*, which likely died unobserved, somewhere in the remote
71 southwest region of Tasmania [painted by, and reproduced with permission from, Graeme Brook].
72 The extinction of a species occurs when the last individual member of that species dies, although the
73 capacity to recover likely diminished long before this point is reached due to genetic deterioration or a
74 breakdown in social cohesion (Brook and Alroy 2017). Even in the early days of colonial settlement, the
75 Thylacine was elusive and rarely seen (Evans 1822; Jeffreys 1820). Persecution by graziers (encouraged
76 by government and private bounties⁵), incidental snaring by fur trappers (Haygarth 2017), habitat
77 modification, and possibly a disease epidemic (Paddle 2012), all contributed to a late 19th and early 20th
78 century population decline, such that Thylacines were regarded as extremely rare by 1910, with the final
79 confirmed kills and captures occurring in the early 1930s (Sleightholme *et al.* 2020).
80 Prior to 1994, the International Union for the Conservation of Nature (IUCN) deemed a species to be
81 extinct if it had not been seen or recorded in the past 50 years. However, Collar (1998) cautions: "*Over*
82 *the past few decades there have been enough rediscoveries to warn us against overhasty assumptions of*
83 *extinction (which may, I suspect, sometimes derive from simplification of the Committee for the*
84 *International Trade in Endangered Species (CITES) criterion of 50 years without a record)*".
85 Sleightholme & Campbell (2016) agree: "...logic dictates that a secretive nocturnal animal, concealed
86 amongst vast tracts of extremely dense vegetation, would persist well beyond the last known capture on
87 the fringe of its habitat" and conclude that "...the Thylacine survived with near certainty beyond the
88 death of the last captive specimen in 1936, and that the species was extant throughout the 1940s, and
89 possibly beyond". Baumsteiger & Moyle (2017) concur on the general principle: "*Determination of*
90 *extinction can be surprisingly complicated. It is often difficult to say with certainty when the last*
91 *individual is gone because most lineages are cryptic at small population sizes, making it difficult to*
92 *determine no reasonable doubt*". The IUCN's 50-year precept has now changed, with the focus shifting
93 from time lapse to exhaustive survey: "*A taxon is extinct when there is no reasonable doubt that the last*
94 *individual has died. A taxon is presumed extinct when exhaustive surveys in known and / or expected*
95 *habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed*
96 *to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and*
97 *life form*" (IUCN 2001), but this does not apparently alter Red List classifications enacted before the
98 change in emphasis.

⁵ The government bounty ran from 1888 until its termination in 1908, although payments continued to be made into 1909. The Van Diemen's Land Company's (VDLC) two bounty schemes ran from 1830 until their termination in 1914, with a two-year hiatus from 1838-1840. A number of local bounties ran in concert with the government bounty.

99 The absence of any road-killed specimen is often cited as firm evidence for extinction (see reviews in
100 Lang 2014). However, in Tasmania the larger marsupial carnivores collectively accounted for only 2.8%
101 of total road kills in a 1979 survey (Smith 1981) and 1.2% in a large inventory collected during 2001–
102 2004 (Hobday and Minstrell 2008). Moreover, animal corpses are rapidly cleared by scavengers,
103 principally Tasmanian Devils (*Sarcophilus harrisii*). A more recent survey by the Tasmanian
104 Conservation Trust (2017), confirms this to still be the case. Smith concludes: “*If a small, dispersed*
105 *population of Thylacines still exists, the probability of one being killed on the road is very small*”.
106 Consequently, the ‘missing roadkill’ argument should not be viewed as conclusive evidence for the
107 extinction of elusive species like the Thylacine.

108 Finally, the notion of an “*exhaustive survey*” as stipulated by the IUCN, has arguably never been fully
109 realised for the Thylacine. Although numerous surveys⁶ have been undertaken, all have been of short
110 duration and limited in scope. Guiler (1985) acknowledged this to be the case: “*It is disappointing that*
111 *no world fauna body has sponsored a thorough search for them, the rarest of the world’s mammals*”.
112 Despite advancements in motion/heat-triggered camera traps, vast remote areas remain poorly surveyed,
113 and there was almost no coverage prior to the 21st century (Brook *et al.* 2018). However, it is worth
114 noting that the probable prime habitat of the Thylacine (the dry forests and grasslands of the eastern and
115 northern regions of the state) have now been repeatedly surveyed with camera traps by PWS, researchers
116 and the general public. As such, the chances of any residual animals remaining undetected in these areas
117 are now very low, and further diminishing as each year passes.

118

119 Sightings

120 L. D. Crawford (1953) of the Queen Victoria Museum (Launceston) wrote that “*There is enough direct*
121 *evidence to suggest that it [Thylacine] is not yet extinct*”. One could justifiably question, when did the
122 quality of sighting evidence, deemed sufficient to suggest species persistence as of 1953, cease to meet
123 the standards for such inference? Guiler (1985) later stated that: “*It never ceases to surprise me that*
124 *since 1936 it has been lamely accepted that the Thylacine was extinct or nearly so, even in the face of*
125 *persistent sighting reports, some of which will stand considerable critical examination*”. Sleightholme
126 & Campbell (2016) later expanded on this sentiment: “*The credibility of post-1936 Thylacine sighting*
127 *reports is invariably questioned, and often disparaged. Why this should be so is not entirely clear, as the*

⁶ Summers, Higgs & Murthick (April, 1937); Fleming (Nov, 1937); Fleming, Boyd, Royle & Sharland (Nov, 1938); Fleay (1945-46); Guiler (1959, 1960, 1961, 1963, 1980-81); Griffith, Malley & Brown (1968-1972 *non-continuous*) (Griffith 1972b); Smith & Pyrke (1980 *non-continuous*); Mooney (1982-1983) and Wright (1984),

128 *validity of sightings for other critically endangered species are rarely dismissed so readily, particularly*
129 *when those observations are reported within a few years of the species last being known to exist. A*
130 *substantial number of reported sightings in the 1940s and early 1950s were made by multiple persons*
131 *sighting the same animal, or by bushmen or farmers with first-hand knowledge of the Thylacine, yet these*
132 *reports appear to carry little or no credence with the scientific community, and one must surely question*
133 *why. We are of the opinion that the sighting data, largely compiled from the species' interactions with*
134 *non-scientists (i.e., bushmen, hunters, farmers, amateur naturalists and members of the public),*
135 *constitutes an important and underutilised source of information about the Thylacine's prevalence and*
136 *former distribution".*

137 Paddle (2014) acknowledges the importance of sightings reports: "*Records of Thylacines post-1936 are*
138 *undoubtedly of interest to the scientist as well as the lay researcher".* Yet, he qualifies his statement by
139 adding: "*While they do not amount to evidence for the continued existence of the species—nothing but a*
140 *body will change that designation—nevertheless, should that evidence be forthcoming, then the*
141 *information obtained from recent sightings will be seen to possess valuable distributional and*
142 *behavioural data of relevance to the continued welfare of the species".* Although the discovery of a live
143 specimen or a carcass would serve as indisputable confirmation of the species' continued existence, it
144 may be overly restrictive to discount potentially credible sightings as evidence unless such definitive
145 criteria are met. Indeed, Roberts et al. (2010) state: *Assessing the validity of alleged sightings is*
146 *particularly important for species that are critically endangered or thought to be extinct. What is*
147 *accepted as a valid sighting can have a substantial effect on any assessment of whether extinction has*
148 *happened, with concomitant implications for the assessment of subsequent sightings".* Quoting (wildlife
149 researcher) David Pemberton, Owen (2003) states: "*...he doesn't rule out the possibility of as few as 50*
150 *having a viable existence... The problem is to prove that existence. Instead, he looks to a statistical*
151 *analysis, to get as close as is possible to a 'proof' of sorts that it may be out there; specifically, 'the area*
152 *that most biologists would agree on, the north-west: the Arthur River, Tarkine, across to Rocky Cape-*
153 *that big block in there. Or stretch it a bit further east to Cradle Mountain, Lake Lea, St Valentine's Peak'.*
154 *That's a large area. A population of fifty to a hundred wouldn't be easy to find. Add to this the animal's*
155 *nocturnal habits and retiring nature and the odds of one being out there are quite high because they*
156 *were in that area in the fifties; they were there".*

157 Beyond physical evidence (kills and captures, with a body or live animal produced), sightings can be
158 sub-divided into two main groups: 1) visual encounters and 2) secondary evidence in the form of tracks,
159 kills, and vocalisations. They can also be immediate (reported within hours, days, or weeks) or

160 retrospective (reported within months or years after the event). Secondary evidence is the most uncertain.
161 Animal tracks, unless made in perfect substrate, can easily be misinterpreted, and even for experienced
162 eyes, tracks of the Common Wombat (*Vombatus ursinus*) or Tasmanian Devil are often confused with
163 those of the Thylacine (Guiler and Godard 1998). Tracks can also be easily faked, and some that have
164 received media attention most likely were. The remains of Thylacine predation are unlike those of dogs
165 (Guiler 1985), but only an experienced pre-1940s bushman or wildlife expert with an in-depth knowledge
166 of the species would be able to state with any confidence that a kill was made by a Thylacine. There were
167 no historical audio recordings made of Thylacine vocalisations and few people living remember them,
168 so any report of calls is questionable and prone to misidentification.

169

170 **Comments on the reliability of reports**

171 There are no obvious qualitative difference between sightings made before and after 1936, when the last
172 captive individual died. That is, in terms of the characteristics (behaviour observed, location/habitat, type
173 of ancillary information, etc.) and overall apparent plausibility of the sightings reported, there is no
174 obvious dividing point in time. These issues were explored in detail in the Supplementary material of
175 Brook *et al.* (2023) and we would encourage careful scrutiny of this material, and in combination with
176 the probabilistic modelling presented here, to form an impartial opinion. In brief, it may not be entirely
177 appropriate, *prima facie*, to simply assume that all post-1936 sightings can be summarily dismissed,
178 given that many of the accounts (rated credible by authorities) hold up to careful scrutiny. It is arguably
179 more appropriate, for all records post-dating the last Thylacine kill or capture, to be considered possible,
180 but uncertain. Logic says that the more time that has passed since the last confirmed record, the less
181 likelihood *any* record has of being correct. This leads to a pressing conundrum: how should one handle
182 the multitude of uncertain sightings? Is it more prudent to discard them for lack of verifiability, or can
183 they be used probabilistically to yield a more nuanced estimate of the most probable extinction date?

184 The majority of sightings recorded between 1910 and 1936 were probably genuine, as there would be
185 little to be gained by an individual reporting a sighting when the species was known to still exist (although
186 the ubiquitous misidentifications no doubt also occurred during this period). After 1936, no such
187 presumption can be made. The fact that the date of the last known Thylacine is precise (a captive animal)
188 has created a psychologically critical point in time. Perhaps if there was less certainty about the last
189 known animal, there would be less scepticism about the validity of sightings around this time.

190 Tammy Gordon, former Collection Officer at Queen Victoria Museum and Art Gallery, Launceston
191 (pers. comm., 2023) states:

192 *“First-hand witness testimony is notoriously unreliable, but once the sighting is recorded by another*
193 *person it becomes second hand testimony and even less reliable. It is subject to potential bias by the*
194 *person receiving the report. Information can be lost or even added, not deliberately, but simply by the*
195 *nature of the process”.*

196 Gordon expands upon this from her own personal experience:

197 *“Confirmation bias has affected the way QVM records might be interpreted. For example, Bob Green*
198 *[former QVM Curator] had a bias toward believing thylacines still existed which attracted a lot of*
199 *sighting reports which then only reinforced Bob’s personal belief/bias. His successor had a firm bias*
200 *toward thylacines being extinct and actively discouraged sighting reports. When this became known*
201 *people quickly learned not to report sightings to the Museum. A drop off in sightings confirmed the new*
202 *curator’s belief that they were extinct. So, the Museum’s lack of sightings in the 1990s reflects a*
203 *reluctance to report rather than a decline in thylacine sightings. In my experience people would actively*
204 *seek out the person who was going to believe them”.*

205 Such critiques are valid. However, most post-1936 reports described herein were sourced from PWS
206 files, undertaken using a set questionnaire with no non-observer input, thus mitigating the bias concerns.
207 The observer simply had to complete a series of set questions to report their sighting. The reports were
208 then critically assessed by experienced PWS staff to see if they warranted further investigation.

209

210 **Previous sighting compilations and associated analysis**

211 There have been past efforts at collating sighting compilations: Griffith, Malley & Brown (1969 – 1972),
212 the Embergs (1970s), Bailey (1968 – 2021), Terry (2005), and Holmes (2019),. However, most were
213 undertaken for personal research, limited in scope, and not formally published or undertaken using a
214 rigorous and systematic method. The most comprehensive and well-documented sighting studies of the
215 Thylacine are those of Smith (1981) and Nix (1986), the latter published as Anon. (1990) as a map with
216 no detail on individual records.

217 Steven Smith, a PWS officer, was formally tasked with investigating and rating the body of available
218 sightings from 1936 to 1980, resulting in 320 observations sourced largely from the records of the
219 Tasmanian National Parks & Wildlife Service (NPWS, now PWS) and the Queen Victoria and

220 Tasmanian Museum archives. He noted that a large number of additional sightings remained
221 undocumented or only anecdotally reported, suggesting that the reason for these unrecorded reports
222 might relate to a fear of public ridicule, or concerns over changes in land use or reservation status should
223 Thylacines still be found to inhabit a specific area. Smith graded⁷ each of the sightings as either good
224 (107), fair (101) or poor (112), with the criteria used to rate the reports being:

- 225 1) The description of the animal,
- 226 2) The observer's credibility and their experience with native fauna,
- 227 3) The circumstances of the sighting (e.g., visibility, period of observation, etc.),
- 228 4) Correlation with other sighting reports and previous Thylacine distribution (from bounty payments
229 and the early Tasmanian literature).

230

231 Smith noted a marked increase in reported sightings after 1950, with 77% of the reports occurring
232 between 1960–1980. This is in part elicited by the well-publicised Griffith, Malley & Brown search:
233 Griffith 1972b, providing some support for the hypothesis that increases in reported sightings can
234 correlate with the timing and intensity of media coverage (e.g., foxes: Marks et al. 2017). Sightings for
235 the period 1936–1980 were reported by a variety of different observers with 'locals' accounting for
236 72.5%, shooters 9.3%, bushwalkers 5.8%, government officers (including police) 5%, tourists 3.5%,
237 anglers 3.1% and four-wheel drive motorists 1%. Most sightings were concentrated in the northern half
238 of the state between latitude 41°S and 41.2°S, with the longitudinal distribution being more dispersed.
239 Between 1970–1980, the majority of sightings were reported from the eastern half of the state, but for
240 the period 1936–1980, the distribution of 'good' sightings was more or less evenly distributed, with
241 concentrations of sightings in the west from 145° 10'E to 145° 20'E, and in the east from 147° 50'E to
242 148° E. There were no seasonal differences in reported sightings (29% summer, 26% winter, 23%
243 autumn, 22% spring). The preponderance of sightings, 95% (298) (n=315), were of a single animal, with
244 65% occurring during the night (6pm–6am), of which 48% were reported during the hours of 6 pm to
245 midnight. The peak hour for sightings was 8–9 pm. The number of observers present at each sighting
246 varied from 1 to 8, with 56% of this total being single observers. In terms of mobility, 55% of sightings
247 were made by motorists and 42% by pedestrians, and 54% of sightings lasted less than 10 seconds.
248 Sightings made from motor vehicles were generally brief, whereas sightings made by pedestrians were

⁷ Smith's scale is still used to this day as a reliable guide with which to rate sightings.

249 typically more extended, with 44% claimed to last for >1 minute. All sightings occurred closer than 500
250 metres, and in 36% of cases, within 10 metres.

251 Nix (Anon. 1990) developed a method called BIOCLIM (an early presence-only surface-envelope
252 species-distribution model), which used location records combined with spatial environmental data to
253 predict where a species or ecosystem should most likely occur. Intrigued by the frequency of Thylacine
254 sightings, he decided to investigate how closely the sightings correlated with a BIOCLIM-generated map
255 of where Thylacines theoretically should still exist. Nix sourced data on where Thylacines were shot and
256 trapped from the late 1800s to the early 1900s from various scientific collections and government records
257 (Anon. 1990). From these data, he produced a map showing optimal, sub-optimal, and marginal areas of
258 potential habitat. He then compared sighting records from 1936 onwards and classified them into three
259 groups based on their level of reliability. Discounting the unreliable sightings, he used the remaining
260 sightings as independent datasets to compare with the BIOCLIM map. The data sets matched well with
261 where the BIOCLIM model predicted that Thylacines should still exist, with the greatest frequency of
262 sightings clustering within the areas of predicted optimum habitat. Statistically, Nix concluded that the
263 chance that these independent data sets should so closely coincide was virtually zero, leading him to
264 assert that “*these people are really seeing Thylacines*”, and advising that a thorough search ought to be
265 made.

266

267 **Tasmanian Thylacine Sighting Record Database (TTSRD)**

268 A detailed understanding of the factors that led to the rapid decline in the Thylacine population in
269 Tasmania is important for informing conservation and extinction biology and was the primary motivation
270 for the creation of the TTSRD (Brook *et al.* 2023). The aim of this work was to produce an exhaustive,
271 documented compilation that also serves as an ongoing, publicly accessible, and regularly updated
272 resource (submission of new records to the corresponding author is welcomed). To this end, all known
273 Tasmanian sighting records (mainland sightings were excluded from the study) that had some form of
274 documentation have been collated for the period 1910 (‘post-bounty’) through to the present (currently,
275 the most-recent entries are from 2020). These records were sourced from Sleightholme & Campbell
276 (2016), Tasmanian Archives & Heritage Office, Queen Victoria Museum & Art Gallery, Tasmanian
277 PWS, Moeller archives, Animals & Birds Protection Board, Guiler correspondence, Bailey files (private),
278 Laird files, International Thylacine Specimen Database (6th revision), Paddle (2000, 2012), Gordon files

279 (private), the Thylacine Museum website⁸ as well as various online platforms. The resultant database is
280 a substantial advance on previous efforts, with four times more sighting records than either the Smith or
281 Nix studies and extended by up to four decades, with rigorous quality control (to find and remove or
282 merge duplicates) and geo-referencing.

283 The database is publicly available for download from *GitHub*: <https://github.com/BWBrook/ttsrd>

284 This includes R code for analysis (see extinction modelling in Brook *et al.* 2023), the database in
285 Microsoft Excel and CSV (flat-file) formats, spatial data layers, and all original sighting documentation
286 provided as image files (scanned or photographed).

287

288 **Structure and format of the database fields**

289 A total of 1,223 records were sourced, and their details entered into the TTSRD in a standardised format.
290 Each record was assigned a unique ID number and the month (or season), year and primary and secondary
291 locations were noted. Additional meta-data included the geographical accuracy of the sighting, observer
292 mobility, time period (day / night), number of observers, number of animals, and the distance from the
293 subject(s) graded on either a three or four-point scale. A record was made of the source reference, the
294 observer reporting the sighting, and any noteworthy remarks pertaining to the sighting. Confidentiality
295 requirements necessitated the redaction of some elements of the source data (e.g., names and addresses)
296 for 89 records, but every effort was made to prevent this impacting on the content of the reports required
297 for analysis.

298 Note that in a recent modelling exercise (Brook *et al.* 2023) the data analysed included 1,237 records
299 (version 1.0). However, recent information revealed that 12 of these records had resulted from errors in
300 earlier analyses of Beaumaris Zoo records, and two others were identified as duplicate reports of the
301 same animal. These amendments have been noted in the Reference tab of the TTSRD, version 1.1.

302 Each sighting was reviewed critically and assigned a type graded on a 10-point scale, from the highest
303 quality, K (kill with confirmed body) to the lowest quality, O*I (report of animal sign [e.g., vocalisations
304 or tracks] that were considered doubtful) [Table 1a]. Each sighting was then quality rated on a 5-point
305 scale from 1 (unlikely or low quality), to 5 (likely/credible) [Table 1b]. Consequently, all the sighting
306 records carry an alpha-numeric type quality/credibility rating identifier. These classifications were also
307 grouped into the broader categories of physical records (PR, $n = 86$), expert observations (EO = 337),

⁸ <http://www.naturalworlds.org/Thylacine/>

308 expert indices (EI = 91), other observations (OO = 601) and other indices (OI = 108). The source record
309 was scanned, and a digital version assigned a unique attachment number. Finally, the database was
310 thoroughly checked for duplicate and erroneous entries, and any found were archived and removed.

311

312

A

Type	Description (S to O*I are subjective)
K	Kill, with body/skin/photograph produced
K*	Claimed kill, no definite body/skin produced
C	Live capture, confirmed
C*	Claimed capture, no live animal produced/confirmed
S	Sighting by experienced observer from 1910s-1940s era (bushman, ranger, wildlife expert, etc.)
SI	Tracks, cats, lair etc. identified prior to 1940 or later by experienced bushman or wildlife expert
O	Observation from non-expert (e.g., public layperson), but still of medium-to-high quality
OI	Tracks, scats, lair etc. identified by non-expert, especially after 1960s, plus all vocalisations
O*	Second-hand and vague accounts (e.g., unclear recounting, few details given, fleeting glimpse, etc.)
O*I	As for O* but for reports of secondary evidence, e.g., tracks, spoor, lair etc.

B

Grade	Description (subjective)
5	Likely/credible
4	Plausible
3	Inconclusive
2	Implausible
1	Unlikely or low quality

313

314 **Table 1.** A) Top: Ten-point type quality scale used to grade sightings. Note that the O* class (the most
 315 commonly assigned in the database, especially for post-1950 observations) includes many lower-quality
 316 records (e.g., likely confusion with dog, quoll etc., fleeting glimpse, less-reliable witness, Thylacine sign
 317 that is medium-to-low quality, etc.) B) Bottom: Five-point credibility quality scale used to grade
 318 sightings. These are based on a synthesis of the observer type, observation details provided, date and
 319 locality, and other information contained in the original record (provided as photographed attachments).
 320 Much of this categorisation is inevitably subjective: we based it on the clarity and detail within the
 321 recounting and in some cases on the background and experience of the observer.

322

323 An analysis of the attributes of each sighting is summarised in Table 2. The geographical accuracy of
 324 sightings was graded from precise, where the exact map coordinates or detailed description of the sighting
 325 location were known, to approximate, centred on our best estimation of the general location of the
 326 sighting, to broad subregion, e.g., ‘west coast’, and finally, unknown. Sighting locations were classified
 327 within three groups: for those reported on a road, path, or track, those reported in the bush (forest,
 328 paddock, plain, off-track), and those sightings for which the location was unknown. Five sightings could
 329 not be placed within these categories; 3 being beach sightings, and 2 reported from within a dwelling,
 330 but were included in Table 2 with unknowns. The number of sightings reported from observers in native
 331 vegetation or away from roads and tracks gradually diminish with time from 1910 to the present day,
 332 with a corresponding increase in sightings observed from roads, tracks and beaches. This finding is
 333 closely correlated with sightings from observers on foot and those in motorised vehicles. These findings
 334 might be attributed to the increasing use of private cars after 1950, the opening up of the interior of the
 335 State with new roads, and the subsequent increase in intra-state tourism that accompanied these
 336 developments.

337

Geog. Acc.	#	Sight Loc.	#	Obs. Mob.	#	Time Per.	#	No. Obs.	#	No. Thyl.	#	Distance	#
Precise	27	Bush	765	Walking	773	Day	533	1	766	1	1043	Near	825
Approx	1149	Road	376	Driving	364	Night	348	2	269	2	99	Far	148
Broad	38	.	.	.	.	.	.	3+	130	3+	77	.	.
Unkn	9	Unkn	82	Unkn	86	Unkn	342	Unkn	58	Unkn	4	Unkn	250

338

339 **Table 2.** Analysis of the attributes of Thylacine sightings from 1910 to 2019, comprising geographical

340 accuracy, sighting location, observer mobility, time period, number of observers, number of Thylacines
341 seen, and the distance from the observer to the subject animal. See text for findings.

342

343 The time of day that sightings were reported was classified into three groups: those made at night
344 (including dusk / dawn with partially obscured visibility), day (under good illumination), and those that
345 were not specified. One sighting included with unknown was reported both day and night. The high
346 percentage of daytime sightings noted by both Sleightholme and Campbell (2018) and particularly this
347 study, indicate the regular occurrence of this behaviour. Gunn (1838) states: “*They are usually nocturnal*
348 *in their attacks on sheep, but they also move about in the daytime*” (such attacks were often misattributed,
349 however). Guiler & Godard (1998) concur: “*It is generally agreed that Tasmanian tigers are nocturnally*
350 *active, despite 47% of all sightings being recorded in daylight hours. Most of the species upon which the*
351 *Thylacine feeds become active in the bush in the early evening... and some are still to be seen lazing in*
352 *the sun... well after sunrise. There is no reason to assume that the tigers would not be active at these*
353 *times*”. Paddle (2000) agrees: “*Significant diurnal hunting behaviours are to be expected*” and continues:
354 “*The majority of late nineteenth- century and early twentieth- century observations of diurnal behaviour*
355 *relate to hunting usually taking place in the morning or late afternoon*”.

356 Observer mobility was categorized within three groups: sightings made whilst driving (4WD, car,
357 motorcycle, bus, etc. or horse riding), those made whilst walking, and sightings where the observer
358 mobility was unknown. The number of observers present when the sighting was made was categorized
359 within four groups: sightings made by a single individual, those made by a pair of observers, sightings
360 made by multiple observers (3 or more), and those where the number of observers was not specified,
361 noted or applicable. The distance from the observer to the subject animal was graded under three
362 categories: sightings made within 30 yards or metres distance, sightings made at more than 30 yards or
363 metres, and those where the distance was not specified. Most observations were of a solitary animal
364 (Table 2), but 24 reports noted multiple sightings without specifying number, with three reports making
365 no reference to number.

366 In summary, on the basis of the patterns in these data (Table 2) the most-typical record is of a *close*
367 *sighting of a single Thylacine by a solitary observer made while walking in the bush during the day* (18%
368 of records, but with a high variance in the specific circumstances).

369

370 **Analysis and discussion**

371 The last fully documented kill of a Thylacine was made by Wilfred Batty at his father's farm at
372 Mawbanna on 13th May 1930 (*Advocate*, 14th May 1930, p.6), see TTSRD [#109] (hereafter all TTSRD
373 records will be referred to with [#ID]). The last confirmed capture (where the live animal was produced)
374 was made by James Kaine at Preolenna in the north-west in March / April 1931 (Sleightholme *et al.*
375 2020) [#127]. However, based on an interview by Guiler, a bushman (Tepper) reported to have caught a
376 female Thylacine and three pups in October 1935 at Dempster Plains [#149], and had started to negotiate
377 their sale to the Hobart Zoo when he claimed that his dog got into their pen and killed them all. In 1937,
378 in the Jubilee Range in the south-west, Joseph Farrow (a bushman familiar with the species) caught a
379 Thylacine in a snare that subsequently broke [#185] Farrow had previously caught a live Thylacine for
380 sale to the Hobart Zoo, and so was familiar with the species.. Trooper Boyd's police report of this incident
381 in August 1937 expressed no doubts about the veracity of the report. Boyd was subsequently asked to
382 accompany Sharland on the November 1938 expedition, indicating a familiarity with the Thylacine and
383 the early trappers.

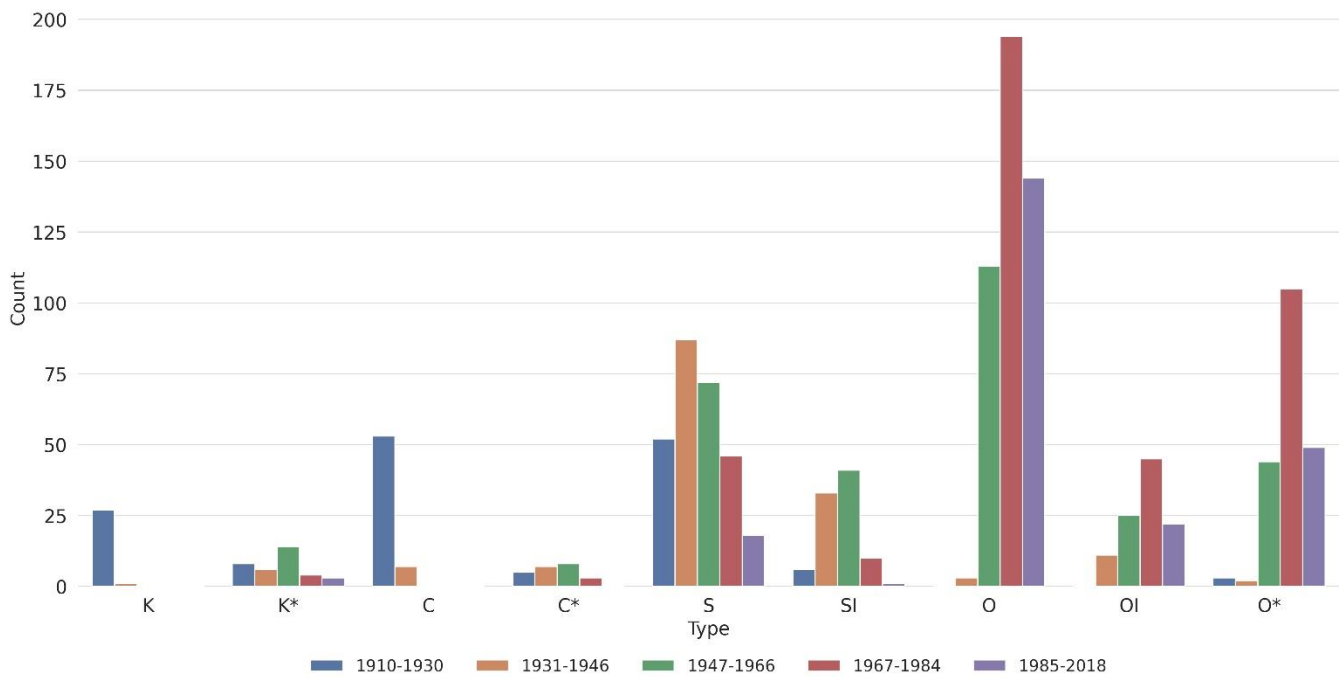
384 The totals for each of the sighting quality types listed in Table 1 were divided on the basis of five different
385 time periods, with date-spans chosen to best reflect the Thylacine's recent sighting history [Table 3]. The
386 five time periods are of variable duration, ranging from 16 to 35 years.

- 387 (i) Post-bounty period through to Batty kill (1910–1930): 21 years;
- 388 (ii) Final captures and pre- and post-war expeditions (1931–1946): 16 years;
- 389 (iii) Guiler early period (1947–1966): 20 years;
- 390 (iv) Concerted push for re-discovery (1967–1984), Griffith, Malley and Brown, Smith and
391 Pyrke, Mooney, Wright: 18 years;
- 392 (v) Contemporary evidence and new technology (1985–2019): 35 years.

393

394 Figure 2 shows Thylacine kills (with the body produced [K] and without [K*]) and captures (with a live
395 animal or other confirmation such as a body, skin, or photograph [C] and without [C*]) for the five
396 designated time periods. As can be seen, the number of confirmed kills and captures diminishes
397 substantially from its peak in 1910-1930. We note that the species was legally protected from the 10th
398 July 1936 onwards, with the risk of fines or possible imprisonment. That said, post-1936 illicit kills (and
399 accidental captures in snares) probably did occur after this date but went unreported for fear of
400 prosecution (Brook *et al.* 2018).

401



402

403 **Figure 2.** Number of reports of Thylacines, categorised by type of record, over five time periods:
 404 1910–1930, 1931–1946, 1947–1966, 1967–1984 and 1985–2019. C: confirmed live capture, C*:
 405 unconfirmed capture, K: kill with evidence, K*: unconfirmed kill with no evidence, O: non-expert
 406 sighting, O*: second-hand and vague accounts, OI: Tracks, spoor, lair and vocalisations by non-experts
 407 after 1960, S: sighting by expert, SI: tracks, spoor, lair prior to 1940 or later by experts (see Table 1a
 408 for further detail on the sighting type). We have not recorded the O*I categories in this figure.

409

410 Many of the unlawful post-1936 purported kills have only come to light in recent years, often after the
 411 individual(s) responsible had died. Griffith (1972a) states: “*It is common knowledge in Tasmania that*
 412 *there were others killed after this date [1936]*”. Bailey (2019) concurs: “*It was well known in rural*
 413 *communities that Thylacines were killed illegally after 1936, either accidentally whilst trapping for*
 414 *game, or with deliberate intent*”, and qualifies his statement by citing Guiler’s 1953 interview with the
 415 bushman Herb Pearce (Guiler 1985, p.116). Pearce recalled that in 1947 his dogs flushed a female
 416 Thylacine and her three pups out of a patch of man ferns (*Dicksonia antarctica*) in an area now flooded
 417 by Lake King William [#259]. Guiler & Godard (1998) state “*Pearce said he turned his dogs on them,*
 418 *but continually dodged the issue as to whether the tigers were killed or not. It is likely that they were,*
 419 *and he knew that it was wrong to kill them*”. Graves (1958) reports on two hunters who caught a Thylacine
 420 in a possum trap and killed it. This incident occurred near the town of Mathinna in the north-east in 1952
 421 [#471]. Terry (2005) details a 1954 account of a retired cattle driver from Pioneer in the north-east who

422 found the rotting corpse of a Thylacine in a snare [#622]. Maynard & Gordon (2014) provide details of
423 a reported Thylacine kill received by the Queen Victoria Museum in 1999. The report [#268] related to
424 a kill in Natone in the north-west in 1949: *“My father was a bushman. One night he arrived home, he
425 was both upset and excited. He put his sugar bag down on the floor and pulled a dead animal from it. It
426 was still warm. He said ‘I have never seen anything like this before’. He then went on to say that he was
427 on his way home from work, the animal had attacked him and no matter how hard he tried to get away
428 from it, it just would not let him get away, so he was forced to kill it with a piece of wood to save his life.
429 This upset him very much, as he did not like to kill animals unless it was food. However, his excitement
430 grew as we looked and touched this strange animal. It had sloped hindquarters. Although it looked like
431 a dog-type, animal it had differences. Its jaw was long and instead of round it looked a little squarer;
432 across its body it had stripes. My father had brought home a Tasmanian tiger. It evidently had pups
433 although he searched for two days he could not find them. Its mate could have taken them and hidden
434 them. The Tasmanian tiger was buried in our garden and the year was 1949”*. Gordon (pers. comm.,
435 24th May 2017), who investigated the report, states: *“She [bushman’s daughter] was very genuine and I
436 didn’t doubt her story”*. In June 1962, a report was received by the NPWS of a Thylacine that had been
437 sighted late one afternoon near Mawbanna in the north-west and a shot had been fired. Although no trace
438 of a body was found following the incident, the description given of the animal was deemed by NPWS
439 authorities to be excellent [#1166].

440 All pre-1936 captures [C] listed within the TTSRD ($n = 48$) are well documented, and with few
441 exceptions, were destined for zoo display. There are 16 live captures listed within the database as
442 occurring post-1936, but with no specimen confirmed [C*]. Griffith (1972a) notes in his diary that in
443 1971, near to the Kerry Lodge Bridge in the north, five young men caught a Thylacine in a rabbit trap.
444 After freeing it, they held it up and accurately noted that its penis protruded backwards. This anatomical
445 peculiarity would have been unknown to them and consequently, adds substance to the sighting. The
446 men reported that when they placed the Thylacine onto the ground it escaped and limped off into the
447 bush [#800]. Bailey (2016) details an interview with the bushman Tom Billett in which he recalled
448 snaring a Thylacine at his property in Smithton in the north-west in the early 1950s that, despite his best
449 efforts to secure it, escaped from the snare [#282]. He recalled: *“The tiger became tangled up in the wire
450 until it suddenly snapped the snare rope and scared the hell out of me as it bolted off into the scrub”*. In
451 the Appendix to *Concerning the Thylacine* (Griffith & Malley 1972, unpublished report), Stingle recalled
452 seeing a Thylacine caught and released by Harry Jenner in the Fingal-Avoca area in the north-east in
453 1947, and then hearing the calls of two Thylacines in the same area three days later [#889]. A 1972 report

454 in the PWS Thylacine files details an interview with the bushman Percy LeFevre of Winneleah, in which
455 he recalled capturing a Thylacine in a snare under the north side of the Blue Tier in the north-east in 1953
456 [#288]. He remembered it breaking loose from the snare as he cautiously approached. The bushman Roy
457 Bliset had snares in the Dip River area in the north-west and reportedly caught a Thylacine in 1943, but
458 nothing remained next morning (no further details) [#785]. Reports of this type from the decades
459 immediately following the 1930s, made by respected bushman who knew the Thylacine well, are difficult
460 to discount.

461 Sightings from experienced observers [S], represented by the bushmen that trapped the Thylacine,
462 together with NPWS Rangers and wildlife experts, are shown in Figure 2. After the kill [K, K*] and
463 capture [C, C*] records, the “S” reports are important, as these observers, being familiar with the animal,
464 would have been less likely to have made an error in identification. From a peak in 1931–1946, these
465 high-quality sightings continue to the present day but in declining numbers. An apparent explanation for
466 the observed decline is that few of the early bushmen and trappers from the 1930s and 1940s are still
467 alive, so the reduction in sighting reports from those with direct familiarity with the animal, from the
468 1950s onwards (Figure 2), is an inevitable consequence of their passing. This also applies to the SI
469 reports, as only experienced bushmen would be readily able to correctly identify tracks, scats or a lair
470 based on past experience from when the species was still present in its habitat. The dearth of S and SI
471 observations in 1910–1930 period (Fig. 2) could be due to the fact that such sightings would have been
472 considered unremarkable and not worth reporting during that time. Nevertheless, post the 1960s the PWS
473 Thylacine files detail numerous sightings that were assessed at the time of their reporting to be
474 “excellent”. For example, in February 1963, a shooting party of three experienced hunters reported
475 sighting a Thylacine near to Greens Creek in the north-east at approximately 50 yards (46 metres). It
476 moved slowly and turned side on to them, giving them a clear sighting and enabling a positive
477 identification [#1176].

478 In 1972, three older bushmen who knew the species well, purportedly observed a Thylacine for 40
479 seconds at Mawbanna in the north-west [#1241]. In the summer of 1962, a NPWS Ranger accompanied
480 by another person described their apparent sighting of a Thylacine walking along a creek at Evandale in
481 the north in pursuit of a rabbit [#1130]. In 1969, an older couple who had previously seen Thylacines at
482 the Melbourne Zoo, said that they sighted a Thylacine at Derwent Bridge in the central highlands crossing
483 the road in front of their car. They were able to give the investigating officer an extremely detailed
484 description [#1173]. In one account from 1989, a group of forestry workers were cutting timber on a
485 concession in the Florentine Valley in the south-west. They were about to commence work when they

486 claim to have encountered a Thylacine which appeared to be lame in the back legs. The workers refused
487 to start work and gave the Thylacine a bowl of water. Their foreman ordered them to vacate the area until
488 the next day in order to give the Thylacine time to recover and move on. The following morning, they
489 could not find the Thylacine, but they did locate remains of an animal killed and eaten by Tasmanian
490 Devils during the night, which they believed to be the Thylacine. This incident, with multiple observers,
491 was not well-reported at the time and is still not widely known [#515].

492

493 **Insert text BOX here (details of prominent sightings)**

494

495 The most widely publicised Thylacine sighting was that made by NPWS officer Hans Naarding south of
496 Togari in the north-west of Tasmania in 1982 (illustrated in Fig. 1 and detailed in the Box) [#401]. A
497 sighting of equal standing to that of Naarding was made by the veteran Thylacine researcher Col Bailey
498 (now deceased) in the remote Weld Valley in the south-west in March 1995 [#417]. Bailey was on a
499 routine field trip to the valley and reported observing a Thylacine at close quarters for several seconds
500 before it disappeared into the bush. Bailey interviewed many of the old bushmen who trapped Thylacines,
501 giving him a unique insight and detailed knowledge of the species. Archer (2013), who is sceptical of
502 the Thylacine’s survival, states: “*When I know the man, like I know Col, that's not just a normal*
503 *sighting.... that's coming from a really credible person whose judgement I would never question*”.
504 Another highly rated sighting was that reported by Ken Clark in the far northeast corner of Surrey Hills
505 in the north-west in 1997 [#1294]. Clark was a security guard out on a routine night patrol when he
506 claimed to witness a steady stream of animals (Tasmanian Pademelon *Thylogale billiardierii*, Bennett’s
507 (Red-necked) Wallaby *Macropus rufogriseus* and Common Wombat *Vombatus ursinus*) cross the road
508 in front of his car. He braked hard, looking to see where they went. Returning his gaze to the road, he
509 saw a Thylacine standing on the road some three metres in front of his car, surrounded by dust. He first
510 thought the animal was a wild dog and intended shooting it if it was, but as soon as the dust settled, he
511 realised it was not. He described the animal as “*being similar to the general build of an Alsatian dog, but*
512 *with a very large head and a medium length, short haired tail held almost horizontally. The hair was*
513 *short and dark brown with clear chocolate-coloured stripes*”. He was struck by the lack of a dog-like,
514 rounded rump – “*instead it sloped back and under*”. He observed the animal for around 1 minute before
515 it left “*turning awkwardly as if there was no articulation in the spine*”. In the official NPWS report on
516 the sighting, wildlife biologist Nick Mooney states: “*He is familiar with local wildlife and not prone to*

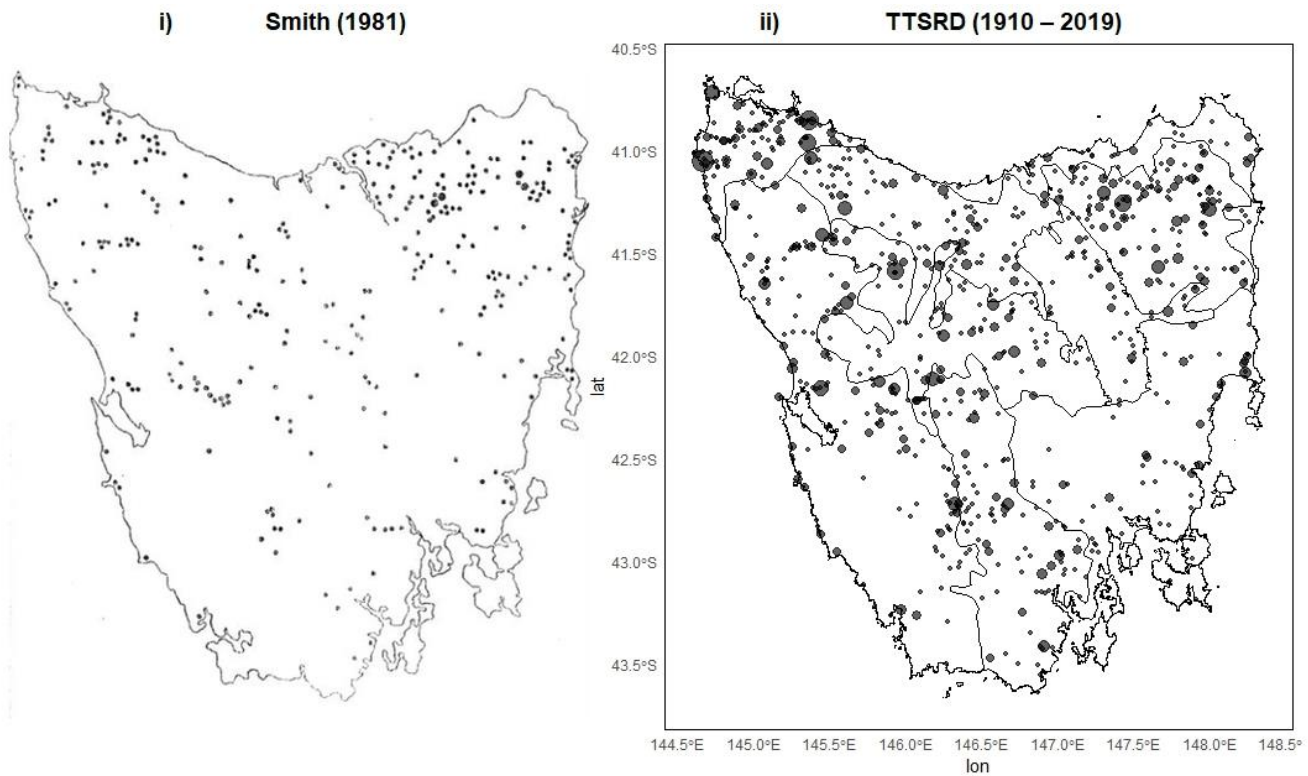
517 *exaggeration. I have little doubt that he believes he saw a Thylacine. If he did it was an adult (i.e.,*
518 *probably resident) and likely a male (at this time of year I would expect an adult female to be suckling*
519 *denned young and therefore have a loose pouch area). In all respects, this sighting is as good, if not*
520 *better, than that of Hans Naarding in 1982. The geographical area has produced most of Tasmania's*
521 *best reports in the past decade”.*

522 The “I” series of reports encompasses tracks, plus all other Thylacine signs (e.g., dens, scats) and
523 vocalisations, identified by bushmen and wildlife experts [SI] or non-experts [OI]. Finally, the “O” type
524 are direct observations that are apparently plausible but come from non-experts and second-hand
525 accounts. Records that contained few details or the description could apply to a different species: i.e., a
526 dog⁹, Tasmanian Devil, cat or quoll *Dasyurus* sp. etc., and where the recounting was unclear or described
527 a fleeting glimpse were assigned as [O*]. Thylacine signs of medium to low quality were given [O*I].
528 As can be seen from the Figure 2, the three “O” series graphs resemble each other in configuration, all
529 with peaks between 1967–1984. This occurrence is possibly explained by the increased interest generated
530 by the publicity given to various searches throughout the period. The greatest number of “O” graded
531 sightings are those reported by motorists that sight Thylacines on country roads, usually at night.
532 Although a number (perhaps most) of these reports appear to be misidentifications, some seem harder to
533 dismiss, particularly when witnessed by more than one individual.

534 The question is apparent that if Thylacines are being misidentified, is a State-wide pareidolia effect
535 occurring, in which observers unconsciously attribute a recognisable form (Thylacine) to a fleeting
536 glimpse of an unknown but superficially similar form (devil, macropod, quoll, cat, dog, or deer)? A study
537 by Paxton & Naish (2019) suggested that reports of the Loch Ness monster were directly influenced
538 by the discovery of dinosaur fossils in the early part of the 19th century. These researchers examined
539 over 1500 sightings from 1801 to the 1930s and concluded that fossils of long-necked marine reptiles
540 appeared to influence what observers reported they saw in the loch. Comparative parallels can be
541 drawn with Thylacine sightings and their relation to media reports.

542

⁹ It is notable, that feral dogs are not known outside areas of human settlement in Tasmania, and none of the field camera studies, Guiler (1961; 1963-1964; 1980-1981), Smith (1978-1980) and Mooney (1982-1983), have ever recorded them (although these were surveys with old-tech cameras prone to malfunction and placed at low density).



543

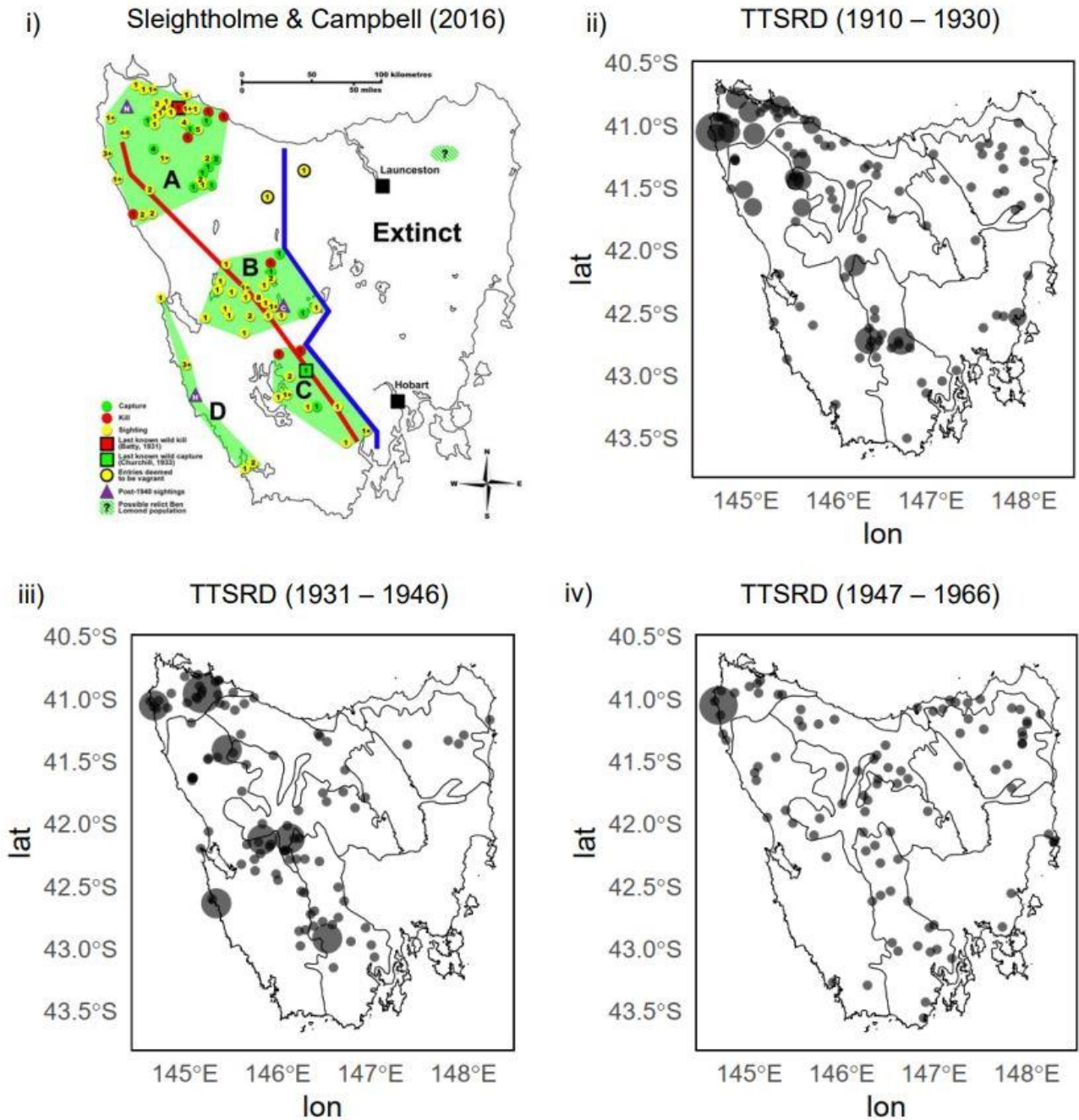
544 **Figure 3.** A comparison between i) Smith (1981) sighting map totals [$n = 315$] for 1936–1980 and ii)
 545 TTSRD map totals [$n = 1223$] for 1910–2019. The size of the circles in map ii) represents the number of
 546 independent Thylacine sightings reported from that location. Internal lines show the borders of the
 547 Tasmanian Interim Biogeographic Regionalisation of Australia (IBRA), provided to show a spatial
 548 visualisation of the varied ecoregions that exist across the island of Tasmania.

549

550 In terms of the spatial information included in the sighting record, Smith (1981, Fig. 3(i)) produced a
 551 total sightings map for the period 1936-1980 ($n = 315$). The most obvious similarity between the Smith
 552 map and an expanded map produced from the TTSRD data [Fig. 3 (ii)] are the density and clustering of
 553 sightings in the far north-east of the State. In an attempt to provide a more reliable map of Thylacine
 554 distribution from 1910 to 2019 than the Smith and the TTSRD maps indicate [Fig. 3], only the most
 555 credible sightings have been retained. If all of the lower grade “O” series sightings are removed,
 556 leaving only the “K”, “C” and “S” series (Fig. 3, $n = 535$), the pattern revealed is different. For 1910–
 557 1930 (Fig. 4 (ii), $n = 169$) and 1931–1946 (Fig. 4 (iii), $n = 144$) there are clusters of sightings located
 558 in the western half of the State, and an indication of post-1936 survival in and around the Ben Lomond
 559 NP in the far north-east. From 1947–1966 (Fig. 4 (iv), $n = 137$), populations in the west, although
 560 diminished, appear to have remained extant. After 1966, the TTSRD records are characterised by a

561 general reduction in the number of sightings across the State.

562



563

564 **Figure 4.** Sightings maps comparing i) Sleightholme & Campbell (2016, $n=127$) for the period 1930–39
565 with the TTSRD for the periods ii) 1910–1930 [$n = 150$], iii) 1931–1946 [$n = 110$] and iv) 1947–1966
566 [$n = 95$], based on the highest quality records of K-, C- and S-type. The size of the circles in maps ii) to
567 iv) indicates the number of independent Thylacine sightings reported from that location (largest circle
568 represents >10 observations), and the internal lines show the borders of the Tasmanian Interim

569 Biogeographic Regionalisation of Australia (IBRA), showing the spatial configuration of the island's
570 ecoregions.

571

572 **Connected sightings?**

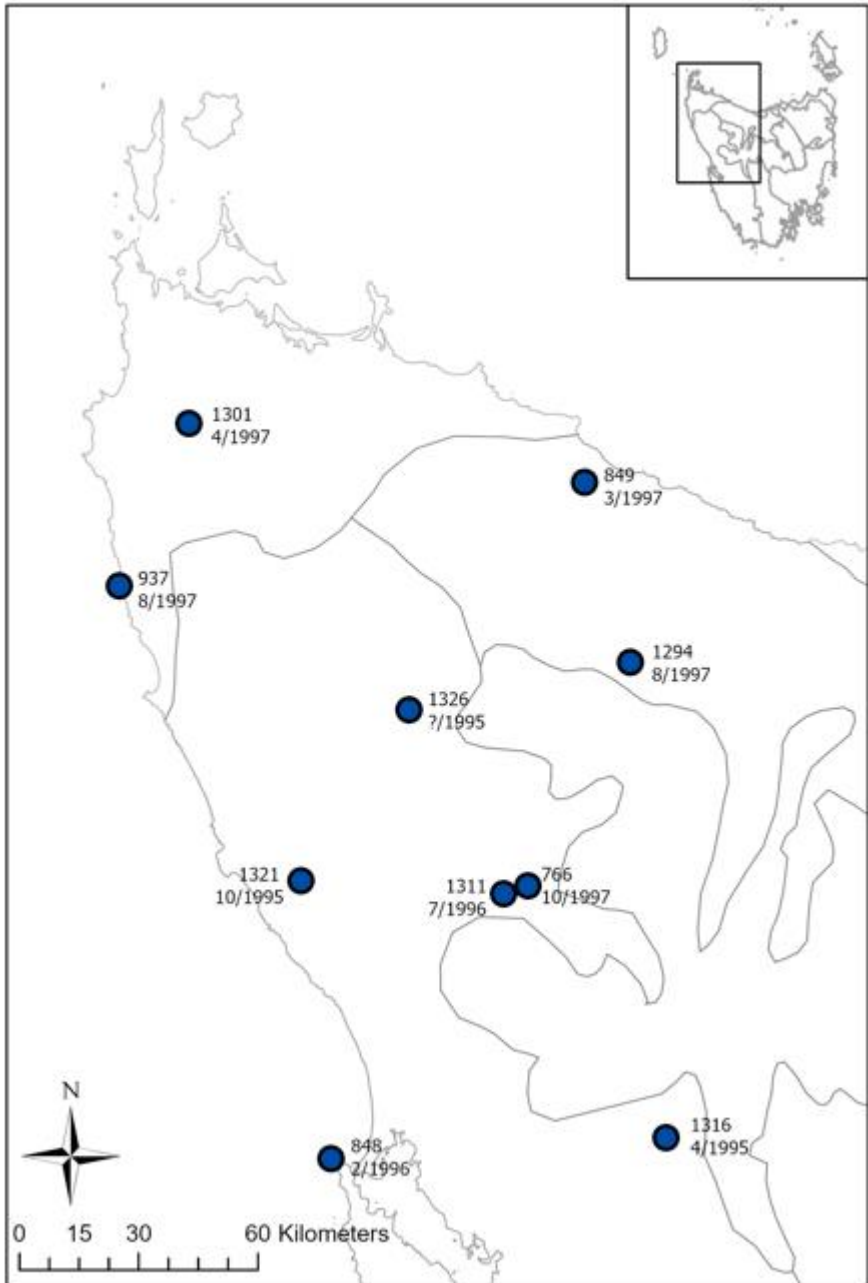
573 In an effort to interpret the spatial patterns of thylacine sighting records in the Fig. 4 maps, an examination
574 of a number of clustered sightings was undertaken. Clustered sightings are those reports made by two or
575 more independent observers of the same animal (or animals) within a specific time span and within the
576 same general geographical locality. Here, we focus on the northwest of Tasmania, an area with a high
577 concentration of sightings within 100-200 km that occurred within a 2-year period. The long-term
578 wandering patterns of individual Thylacine are unknown; however, large cursorial predators typically
579 range widely, and the Tasmanian Devil can move 10 to 15 km in a single night of foraging. Collectively
580 when the sighting attributes are assessed, clustered reports acquire added importance as the probability
581 of them being contrived or the animal misidentified is low, especially if independently reported.

582 In May 2002, a couple were travelling along a road in the far northwest of Tasmania and reported sighting
583 a Thylacine sniffing the road for 30 seconds at 250 metres [#1273, graded O5]. This was a day-time
584 sighting. In their report to the PWS they state: "*Sniffing the road and wandering on the road. Its
585 movement was very different with front feet moving together and back feet together – a bounding motion.
586 Extremely distinct tail, straight out and no significant rump/backside. Very dark brown, but did not see
587 any stripes on it at all. Approximately 600 mm high at the middle of the back. Most of the time facing the
588 vehicle, not side on. If any stripes, they were not visible. Gone quickly when aware of the vehicle with
589 very big leaps. Definitely not a devil or either of the quolls – too big*". One month later, along the same
590 stretch of road, an environmental scientist with detailed knowledge of the species, described seeing a
591 juvenile Thylacine [#422, graded S5]: "*The animal was walking slowly along the track facing me, and I
592 could see that it was quite slender, but still about the height of a medium sized dog. The colour appeared
593 chocolate brown with golden tinges on hair around the edges of the body. The sun had broken through
594 and was shining in the animal's face. Its head was down casually sniffing the ground, and it took a second
595 or so to realise I was approaching... As I approached at high speed the animal looked up suddenly, then
596 turned, and ran to the side of the track. I clearly saw an unmistakable Thylacine shape and loping running
597 style. As it reached the track verge the animal bounded about 3m across a gutter cutting. While it was
598 stretched out in mid-air several images were burned in my mind; the sharp back hocks and tail
599 continuous with the body, the large head and round paw-like front feet, the deep chest. The body hair*

600 *was short and smooth. The animal used its tail as a rudder while in mid-air... Returning to the car I*
601 *immediately made a drawing of the animal, and a copy of that original is shown below. I could not see*
602 *the stripes, but I tell you I did not need to. Tigers in high rainfall areas are said to be darker (Paddle,*
603 *2000, p.45), and while it was running I would not have expected to see the stripes anyway. The closest I*
604 *got to this animal was about 20m, and the total sighting lasted around six seconds. It was definitely a*
605 *juvenile Thylacine about 18 inches tall”. The following day, he reported seeing an adult Thylacine on*
606 *the same section of road: “At 4:30 [the next] afternoon (23/5/02) I was back at the same spot, parked on*
607 *the side of the track with the back of the car open before a long straight section; preparing for a long*
608 *night vision stake-out with an invisible infra-red spotlight. At about 5pm the light was fading so I spread*
609 *the chicken and cat food along the track. After that I returned to the car, then walked across the track to*
610 *wash my hands in the same creek which had created noise to muffle sound of the approaching car the*
611 *day before. I carried a video camera at all times. After washing my hands, I was walking back across the*
612 *track to the car with video camera in hand, looked down the track and saw a large animal walking across*
613 *about 150m away. Instantly I recognised it as an adult Thylacine. This second animal was very large,*
614 *with shape and size similar to a panther; longer in the body than the juvenile seen the day before. It was*
615 *walking casually across the track apparently unaware that I was there. Its head was held quite low as*
616 *though it was tired, but its general walking gait was very stealthy; a creepy, flowing, robotic walking*
617 *style I have certainly never seen before. The back line appeared to stay the same while the legs moved*
618 *underneath. This animal was the same colour as the smaller one seen the day before; like the colour of*
619 *a Tasmanian pademelon, but a more solid, intense, velvety brown. I could not see the stripes, which is*
620 *not surprising from that distance. Again, I tell you that I did not need to see the stripes. The shape of this*
621 *animal was absolutely, unmistakably Thylacine, with the longer body of a large adult male. The shape*
622 *was perfectly silhouetted against the pale road base of the track”. The following month, again, along the*
623 *same stretch of road, an experienced bushman claimed to have observed a Thylacine chasing two*
624 *Common Wombats across the road at 5 metres for more than 10 seconds [#973, graded O5]. On returning*
625 *home, he reported his sighting to the Thylacine researcher James Malley, who rated the sighting highly.*
626 *We therefore have four Thylacines reported by three independent observers (one couple) along the same*
627 *section of road within a two-month time span. All observers reported that the Thylacine they saw was of*
628 *a darker form, which is not the morph typically seen in illustrations (Sleightholme & Campbell 2018) or*
629 *in any surviving museum specimens, but they do accurately describe the Thylacine’s bounding gait and*
630 *distinctive morphological features e.g., straight tail. Clustered reports like these are difficult to discount,*
631 *as it is less likely that all observers could made the same error in identification.*

632 Also, in the north-west, near the previously described Clarke sighting [#1294, assigned O5] (Fig. 5),
633 there were seven other sightings reported within 100km between 1995–1997. One sighting was assigned
634 S5 [#849], and the remaining six were assigned O5 [#937, #1300]; O4 [#766, #1316]; O2 [#1311]; and
635 O1 [#848] respectively. It is also interesting that the PWS rated two of these sightings [#1294 and #937]
636 as “*the most promising sightings in 10 to 20 years*”.

637 All of the sightings are located in areas of optimum Thylacine habitat as defined by Nix (Anon. 1990).
638 By observing the month, it is possible to show a plausible movement pattern of a lone Thylacine moving
639 from the south to the north of the state (and its return) over a two-year period [Fig. 5]. These non-random,
640 clustered “S” and “O” sightings therefore seem to collectively support Thylacine presence in the area. A
641 plausible explanation (contrary to the “null” expectation that all eight were misidentifications) is that the
642 observers did indeed see a Thylacine, and that in all probability, the species persisted in the northwest of
643 the state, at low numbers, until the end of the last century.



644

645 **Figure 5.** Map of collected sightings from northwest Tasmania, from 1995 to 1997, with TTSRD
 646 identification numbers and observation date indicated. Many such spatio-temporal clusters of sightings
 647 exist in the TTSRD, but it remains a matter of conjecture as to whether these represent the movements
 648 of one (or more) individual Thylacine(s), or simply the chance aggregation of multiple false sightings.

649

650 **Conclusion**

651 Using the TTSRD as a basis, our companion paper concluded via a spatio-temporal statistical analysis
652 that accounted for sighting-record uncertainties (Brook *et al.* 2023), that the Thylacine likely persisted
653 for many decades after the last captive animal died in 1936. The statistical summaries and scrutiny of the
654 records presented here lend some credence to this hypothesis. However, the population clearly never
655 made the recovery hoped for by Guiler (1985, p.181). Instead, the evidence collected within the TTSRD
656 suggests that the species was in decline from the 1930s, with subsequent clustered sighting reports
657 indicating a fragmented distribution of remnant populations containing a few individuals potentially
658 surviving in the west of the State to the turn of the 21st Century. This is supported by the data presented
659 in Fig. 2 for S-type sightings, with uncertainty modelling done on these data by Brook *et al.* (2023)
660 suggesting extinction most likely occurred between the late 1980s and early 2000s. Whether the species
661 can still be found in Tasmania today remains a matter of conjecture, although quantitative modelling
662 suggests a low statistical probability (Brook *et al.* 2023; Carlson *et al.* 2018). Ultimately, this outstanding
663 question on the fate of the Thylacine is unlikely to be resolved conclusively to everyone's satisfaction,
664 until a comprehensive (i.e., geographically extensive, temporally sustained) survey, based on a widely
665 distributed network of motion/heat-triggered camera traps, is undertaken throughout the last possible
666 habitats in the remote southwest of the island.

667

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References

676

677 **Anon. 1990.** Computers help to hunt the Tasmanian tiger. *New Scientist* **125**: 24.

678

679 **Archer, M. 2013.** ABC radio interview with Col Bailey, 7th May 2013.

680

681 **Bailey, C. 2016.** *Lure of the Thylacine*. Echo Publishing: South Melbourne.

682

683 **Bailey, C. 2019.** Personal communication, 8th April 2019.

684

685 **Baumsteiger, J. and Moyle, P.B. 2017.** Assessing extinction. *BioScience* **67**: 357-366. doi:
686 10.1093/biosci/bix001.
687
688 **Brook, B.W. and Alroy, J. 2017.** Pattern, process, inference and prediction in extinction biology. *Biology*
689 *Letters* **13**: 20160828. doi: 10.1098/rsbl.2016.0828.
690
691 **Brook, B.W., Sleightholme, S.R., Campbell, C.R. and Buettel, J.C. 2018.** Deficiencies in estimating the
692 extinction date of the thylacine with mixed certainty data. *Conservation Biology* **32**: 1195-1197. doi:
693 10.1111/cobi.13186.
694
695 **Brook, B.W., Sleightholme, S.R., Campbell, C.R., Jarić, I. and Buettel, J.C. 2023.** Resolving when (and
696 where) the Thylacine went extinct. *Science of the Total Environment* **877**: 162878. doi:
697 10.1016/j.scitotenv.2023.162878.
698
699 **Carlson, C.J., Bond, A.L. and Burgio, K.R. 2018.** Estimating the extinction date of the thylacine with
700 mixed certainty data. *Conservation Biology* **32**: 477-483. doi: 10.1111/cobi.13037.
701
702 **Collar, N.J. 1998.** Extinction by assumption: or, the Romeo error on Cebu. *Oryx* **32**: 239-244. doi:
703 10.1046/j.1365-3008.1998.d01-51.x.
704
705 **Duffy, K. 2010.** Identifying sighting clusters of endangered taxa with historical records. *Conservation*
706 *Biology* **25**: 392-399. doi: 10.1111/j.1523-1739.2010.01612x.
707
708 **Evans, G.W. 1822.** Description of Van Diemen's Land, pp. 56-57.
709
710 **Graves, K.E. 1958.** Walkabout, 1 April 1958, pp. 15-16.
711
712 **Griffith, J. 1972a.** Diary entry, Queen Victoria Museum & Art Gallery archives.
713
714 **Griffith, J. 1972b.** Search for the Tasmanian tiger. *Natural History* **81**: 70.
715
716 **Griffith, J. and Malley, J. 1972.** *Concerning the Thylacine*. Unpublished Report, Queen Victoria Museum
717 & Art Gallery archives.
718
719 **Guiler, E.R. 1985.** *Thylacine: The Tragedy of The Tasmanian Tiger*. Oxford University Press: Melbourne,
720 Australia.
721
722 **Guiler, E.R. and Godard, P. 1998.** *Tasmanian Tiger: A Lesson To Be Learnt*. Abrolhos Publishing: Perth,
723 Western Australia.
724
725 **Gunn, R.C. 1838.** Notices accompanying a collection of quadrupeds and fish from Van Diemen's Land
726 (Addressed to Sir W. J. Hooker, and by him transmitted to the British Museum). With notes and
727 descriptions of the new species by J. E. Gray, F.R.S. *Annals and Magazine of Natural History, Zoology,*
728 *Botany and Geology* **1**: 101-111.
729

730 **Haygarth, N. 2017.** The myth of the dedicated thylacine hunter: stockman–hunter culture and the
731 decline of the thylacine (Tasmanian tiger) in Tasmania during the late nineteenth and early twentieth
732 centuries. *Tasmanian Historical Research Association* **64**: 30-45.
733

734 **Hobday, A.J. and Minstrell, M.L. 2008.** Distribution and abundance of roadkill on Tasmanian highways:
735 human management options. *Wildlife Research* **35**: 712-726. doi: 10.1071/WR08067.
736

737 **Holmes, B. 2019.** [https://recentlyextinctspecies.com/database/the-Thylacine-archive/13-articles/60-](https://recentlyextinctspecies.com/database/the-Thylacine-archive/13-articles/60-Thylacine-sighting-reports)
738 [Thylacine-sighting-reports](https://recentlyextinctspecies.com/database/the-Thylacine-archive/13-articles/60-Thylacine-sighting-reports), accessed 11/5/2019.
739

740 **IUCN 2001.** IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN,
741 Gland, Switzerland and Cambridge, UK.
742

743 **Jeffreys, C.H. 1820.** *Geographical and descriptive delineations of the island of Van Diemen's Land*. J.M.
744 Richardson: London.
745

746 **Lang, R. (Ed.) 2014.** 'The Tasmanian Tiger : Extinct or Extant?' (Strange Nation Publishing: United States)
747

748 **Marks, C.A., Clark, M., Obendorf, D., Hall, G.P., Soares, I., and Pereira, F. 2017.** Trends in anecdotal
749 fox sightings in Tasmania accounted for by psychological factors. *Conservation Biology* **31**: 1450-1458.
750 doi: 10.1111/cobi.12944
751

752 **Maynard, D. and Gordon, T. 2014.** *Tasmanian Tiger - Precious Little Remains*. Queen Victoria Museum
753 & Art Gallery: Launceston.
754

755 **McKnight, M. 2008.** *Thylacinus cynocephalus*. The IUCN Red List of Threatened Species. Version 2012.2.
756 Accessed: 24/3/2013, <http://www.iucnredlist.org/>.
757

758 **Mooney, N. 1984.** *Search for Thylacines in northwest Tasmania*. Unpubl. research project report.
759 National Parks and Wildlife Service, Hobart., Tasmania.
760

761 **Nix, H.A. 1986.** A biogeographic analysis of Australian elapid snakes. Atlas of elapid snakes of Australia:
762 Australian flora and fauna series 7 (ed. by R. Longmore), pp. 4-15. Bureau of Flora and Fauna, Canberra.
763

764 **NMA 2019.** National Museum of Australia FAQ sheet.
765

766 **Owen, D. 2003.** *Thylacine: The Tragic Tale of the Tasmanian Tiger*. Allen & Unwin: Sydney, Australia.
767

768 **Paddle, R. 2000.** *The Last Tasmanian Tiger: The History and Extinction of the Thylacine*. Cambridge
769 University Press: Cambridge, UK.
770

771 **Paddle, R. 2012.** The thylacine's last straw: epidemic disease in a recent mammalian extinction.
772 *Australian Zoologist* **36**: 75-92. doi: 10.7882/AZ.2012.008
773

774 **Paddle, R.N. 2014.** Scientists and the construction of the Thylacine's extinction. Pp. 155 in The
775 Tasmanian Tiger: Extinct or Extant. edited by Strange Nation Publishing.
776

777 **Paxton, C.G.M. and Naish, D. 2019.** Did nineteenth century marine vertebrate fossil discoveries
778 influence sea serpent reports? *Earth Sciences History* **38**: 16-27. doi: 10.17704/1944-6178-38.1.16.
779

780 **Roberts, D.L., Elphick, C.S. and Reed, J.M. 2010.** Identifying anomalous reports of putatively extinct
781 species and why it matters. *Conservation Biology* **24**: 189-96. doi: 10.1111/j.1523-1739.2009.01292.x.
782

783 **Sleightholme, S.R. and Campbell, C.R. 2016.** A retrospective assessment of 20th century thylacine
784 populations. *Australian Zoologist* **38**: 102-129. doi: 10.7882/AZ.2015.023.
785

786 **Sleightholme, S.R. and Campbell, C.R. 2018.** Stripe pattern variation in the coat of the Thylacine
787 (*Thylacinus cynocephalus*). *Australian Zoologist* **40**: 290-307. doi: 10.7882/AZ.2018.024.
788

789 **Sleightholme, S.R., Gordon, T.J. and Campbell, C.R. 2020.** The Kaine capture - questioning the history
790 of the last Thylacine in captivity. *Australian Zoologist* **41**: 1-11. doi: 10.7882/AZ.2019.032.
791

792 **Smith, S.J. 1981.** *The Tasmanian Tiger, 1980: A Report on the Investigation of the Current Status of the*
793 *Thylacine Thylacynis cynocephalus, funded by the World Wildlife Fund Australia.* National Parks &
794 Wildlife Service, Tasmania: Hobart.
795

796 **Tasmanian Conservation Trust 2017.** Road kill survey. [http://www.tasconservation.org.au/tas-](http://www.tasconservation.org.au/tas-conservationist/2017/5/5/roadkill-a-survey-of-state-road-authorities-and-local-government)
797 [conservationist/2017/5/5/roadkill-a-survey-of-state-road-authorities-and-local-government](http://www.tasconservation.org.au/tas-conservationist/2017/5/5/roadkill-a-survey-of-state-road-authorities-and-local-government). Accessed
798 30/4/2019.
799

800 **Terry, N. 2005.** *Tasmanian Tiger Alive and Well.* Edward Terry: Dairy Plains, Tasmania, Australia.
801

Box: *Notable post-1936 Thylacine sightings in Tasmania*

Since the death of the last captive Thylacine at the Hobart Zoo in 1936, there have been hundreds of unconfirmed sightings. Many can be discounted as simple misidentifications, but some are harder to dismiss. Below is a selection of some of the more convincing sightings:

- Police Officer Billing's two separate sightings of a Thylacine near Waratah (northwest Tasmania) in 1942, one at a distance of 6 metres and the other at ~50 metres. Billing completed an extensive report on the sightings for his superintendent. [#206 TTSRD]
- In 1952, Dr Eric Guiler interviewed the legendary bushman Herb Pearce, whose family submitted many claims during the bounty years. Pearce recalled an incident in 1947, in an area now submerged by Lake King William, where he set his dogs onto a female Thylacine and her three pups. Guiler believed Pearce's claim to be a true account and that all these Thylacines were killed. [#259 TTRSD]
- In February 1959, Les Barnard sighted a juvenile Thylacine in the lights of his car on a forestry road near the Arthur River. He observed the animal for several minutes and noted its stripes. The incident was reported at the time to the Queen Victoria Museum in Launceston. [#702 TTSRD]
- In 1972, a crew of forestry workers working near Trowutta observed a Thylacine at 150 yards walking down the track towards them. The Thylacine approached to within 100 yards before dashing off into the scrub. [#865 TTSRD]
- In 1981, John Yates and three fishing colleagues observed a Thylacine walking along a west coast beach. Yates owned a Thylacine skin snared by his wife's grandfather, so he was familiar with the species. As the group of fishermen all reported the same sighting, mistaken identity is improbable. [#395 TTSRD]
- Perhaps the most important sighting to date is the much-publicised sighting of Hans Naarding south of Togari in March 1982. Naarding, a PWS officer, observed a Thylacine from his vehicle, using a spotlight, for several minutes. His account was detailed and convincing, and the way it was investigated during the subsequent two years leaves no doubt that the TPWS was convinced at this time that the Thylacine still existed. The redacted PWS report (Mooney 1984) on the investigation states: "*It was concluded that the search area was used at least irregularly by Thylacines until Autumn 1982 but use diminished due to increased disturbance to the point that detection of animals is not probable, despite large efforts. Unless the Thylacine observed in March 1982 by the Service biologist was the last of the species, it must be accepted that Thylacines survive in a number of areas in Tasmania*". [#401 TTSRD]

- Peter Carter, an old-time prospector and game trapper who knew the Thylacine well, claims to have seen a tiger in 1983 near the area where Naarding made his sighting. The sighting was at night, and he followed the animal in his spotlight for around 3 minutes. [#867 TTSRD]
- In 1986, an elder bushman Turk Porteus who was familiar with Thylacines from the early part of the century, sighted a female Thylacine near the Frankland River. Porteus records that he observed the Thylacine for several minutes before she shot off into the bush. [#406 TTSRD]
- In 1989, a group of forestry workers (Barratt, Burns, Henderson & others) employed by the Australian Newsprint Mills on the Florentine Valley concession were about to commence work preparing an area for logging when they came across a lame Thylacine. The gang refused to start work and, giving the Thylacine a bowl of water, waited for the gang foreman who ordered them to vacate the area until the next day in order to give the tiger time to recover and move on. The following day, they did not find the tiger, but did locate the remains of an animal killed and eaten by devils during the night. They believed the remains to be those of the tiger. All of the men came from long-time resident forestry families and knew the Thylacine well [#515 TTSRD].
- Another significant sighting is that of respected author and Thylacine researcher Col Bailey at the Snake River in March 1995. Bailey researched Thylacine sightings for nearly 40 years and knew the animal and its habits well, so an error in identification is highly improbable. Bailey encountered a Thylacine on a field trip and observed the animal at close quarters for several minutes. [#417 TTSRD]
- In May 2002, an environmental scientist working in the southwest of the state observed an adult and juvenile Thylacine in the same location, a day apart. The scientist was familiar with Tasmania's wildlife, having worked in the bush for five years, so an error in identification is improbable. [#422 TTSRD]

High-quality sighting reports such as these highlight the necessity to properly assess the reliability of sightings data in any assessment of extinction.