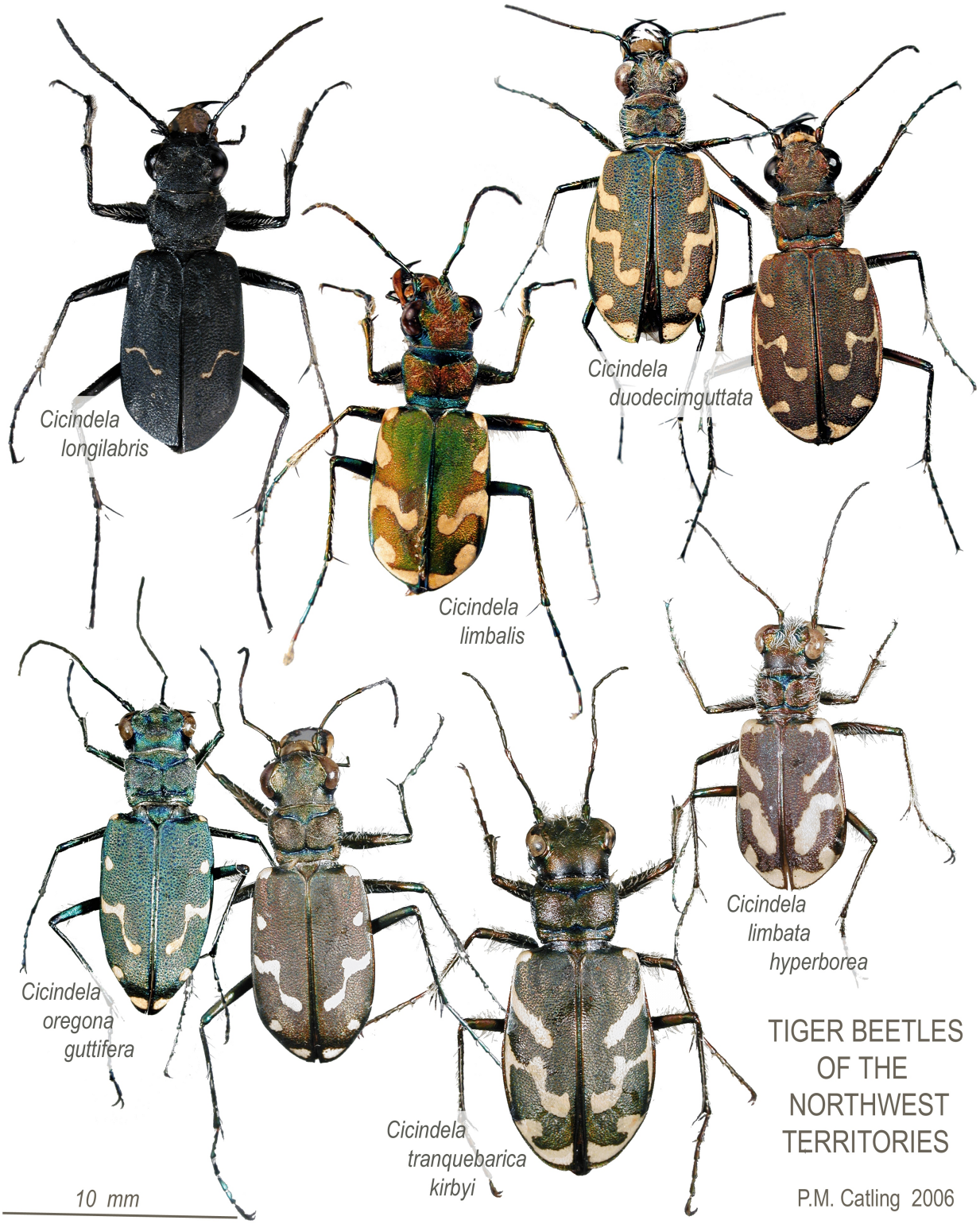

TIGER BEETLES OF THE NORTHWEST TERRITORIES

P.M. Catling 2006

TIGER BEETLES (CICINDELIDAE)

OF THE

NORTHWEST TERRITORIES:

DISTRIBUTION, STATUS AND OTHER INFORMATION

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DRAFT 1, March 2006

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FRONT COVER: Six species of Tiger Beetles known from the Northwest Territories. Label information as follows (from left to right and top to bottom): ***C. longilabris*** (NWT - Muskeg River, N of Fort Liard, 60.3049 N, -123.3153 W, 21 July 2004, *P.M. Catling*). ***C. limbalis*** (NWT - 17 km N of BC, 23 June 1988, *B.L. and J.L.Carr*). **C. duodecimguttata** (specimen on left (in sleeping position) approaching *C. repanda*, NWT - Petitot River, S side of Fort Liard, 60.2361 N, -123.4830 W, 21 July 2004, *P.M. Catling*; specimen on right, NWT - Taltson River, 60.3554 N, -111.2760 W, 23 July 2003, *P.M. Catling*). ***C. oregona guttifera*** (greenish specimen on left, YU, Marsh Lake, 6 Aug. 1987, *B.F. and J.L. Carr;* specimen on right, YU, hwy 4, 573 km N of hwy 1, 30 July 1987, *BF and JL Carr*). ***C. tranquebarica kirbyi*** (Salt Plain (W of Fort Smith), 11 June 1950). ***C. limbata hyperborea*** (Fort Smith, 21 July 1950, *J.B. Wallis*). All specimens in CNC.

BACK COVER: Some of the remarkable disjunct occurrences of Tiger Beetles in Yukon and Alaska that were likely present in the "Mammoth Steppe" From top to bottom. ***C. limbata nympha*** (ALASKA, Nogahabara dunes, 65 m N of Galena, 25 June 1989, *M. Polak. D.M. Wood*). ***C. terricola terricola*** (YU, Whitehorse, 7 July 1979, *B.F. and J.L. Carr*).***C. decemnotata*** (YU, Whitehorse, 4 July 1987, *B.F. and J.L. Carr*). All specimens in CNC.

ABSTRACT

Six species of tiger beetles and one hybrid are given status ranks in the Northwest Territories based on number of occurrences and distributional area within the territory. *Cicindela limbata hyperborea,* a restricted subspecies occurring in the Fort Smith area, is ranked as S3 indicating species that is believed not to be at risk of extirpation or extinction, but that may require special attention or protection to prevent them from becoming at risk. The remaining species and hybrid including *Cicindela duodecimguttata, Cicindela duodecimguttata* X *oregona, Cicindela limbalis, Cicindela longilabris longilabris, Cicindela oregona guttifera*, and *Cicindela tranquebarica kirbyi,* are ranked as S4 indicating that they aresecure. The ranking is based on a database of 306 records each defined as unique combination of date, location and collector, representing 22 localities and 865 individuals. Distribution maps and notes on ecology and classification are included. Rejected taxa, possible additions and species of adjacent regions are all discussed. Information on identification is also included to facilitate monitoring.

INTRODUCTION - TIGER BEETLES OF THE NORTHWEST TERRITORIES

Information is provided here on six species of Tiger Beetles (*Cicindela* spp.) that have been found in the Northwest Territories. Some regions of Canada north of 60˚ North Latitude have not been adequately surveyed by entomologists and other species may occur here, possibly as many as 10. To assist in monitoring and study in this region information on species in adjacent regions is included. The work is primarily aimed at status ranking but will also provide a benchmark for further study in the north.

WHY TIGER BEETLES?

They are attractively coloured, easily identified, and they are favourite insects. People have studied them, not because they are beneficial or because they are pests - but simply because they are interesting and their study improves our understanding of the natural world. Just as there are field guides to butterflies and dragonflies, there is now also a field guide to Tiger Beetles (Pearson et al. 2006). There is even a scientific journal called "Cicindela" devoted entirely to Tiger Beetles, but the best way to start is to get a copy of John Acorn's book entitled "Tiger Beetles of Alberta" (see references).

There are roughly 2.5 thousand species of Tiger Beetles worldwide. In North America there are 109 and in Canada there are 36. There are six in the Northwest Territories. Since they are well known, widespread and have specific habitat requirements, they serve as valuable indicators of the general state of the environment. The Canadian species have recently been given status ranks for each Canadian province and territory in order to provide a baseline for future monitoring of Canadian biodiversity. The information included here is part of the development of that baseline for the north.

MORE ABOUT TIGER BEETLES

Tiger Beetles are about 1/2 to 3/4 inch (1-2 cm) long. The species found in the Northwest Territories occupy more or less open habitats. Active during the day, they both fly and run. Running they can cover 1/2

m in a second. They have large mandibles and prey on other insects. They locate food by sight and live mostly in open places. The larvae are also carnivorous but they lie in wait for passing insects at the mouths of ground burrows. For information on setting up a terrarium for tiger beetles, especially for teaching children, see www.royalalbertamuseum.ca/natural/insects/projects/tigerbee.htm

Figure 1. Open sandy habitat of the Twelve-spotted Tiger Beetle (Cicindela duodecimguttata) *on bank of Taltson River east of Fort Smith (60.3554˚ N, -111.2760˚ W). Photo P.M. Catling 2003.*

STUDY OF TIGER BEETLES IN NORTHWEST TERRITORIES

Much of the information on tiger beetles in the Northwest Territories was obtained by entomologists studying biting insects in and around 1950 during the Northern Insect Survey project. One of North America's tiger beetle experts, John Braithwaite Wallis, made an extensive collection of

tiger beetles around Fort Smith during this project in 1950. He was author of the major reference work on the tiger beetles of Canada, but he studied butterflies and dragonflies as well. He was born in England in 1877, emigrated to Canada in 1893 grew up near Portage la Prairie, became a teacher, later a principal and organized the the natural science program for Winnipeg schools. He retired in 1945, continued his entomology studies at the University of Manitoba. Wallis published his classic text on the tiger beetles of Canada in 1961 with the help of Dr. George Ball (see Acorn 2001). He died the following year. Wallis was a very influential man who stimulated many to an interest in entomology, radiated enthusiasm and a possessed a deep love of nature (Reigert 1989). He is commemorated in the very important J.B. Wallis Museum of Entomology (curated by Dr. Rob Roughley) at the University of Manitoba.

The earliest collections of tiger beetles from Northwest Territories seen by the author are those made by C.H. Crickmay in 1922 and 1923. In a database developed for this work there are 306 unique records (unique location and/or date and/or species and/or collector) representing 22 locations and including 865 individuals. Most of this information is from the CNC (the Canadian National Collection of Insects maintained by Agriculture and Agri-Food Canada on the Central Experimental Farm in Ottawa).The database also includes records from the Canadian Museum of Nature and the J.B. Wallis Entomology Museum at the University of Manitoba. All 865 specimens, were examined and verified by the author.

The collectors of tiger beetles in northwestern North America (Alaska (AK), Yukon (YK), Northwest Territories (NT) based on labels in the CNC include (name followed by year of collection): J.A. Kucshe 1916 (YK); C.H. Crickmay 1922, 1923

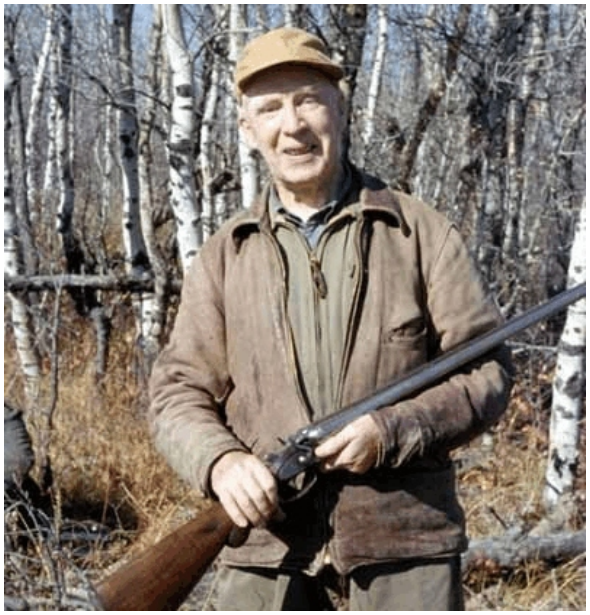


Figure 2. John Braithwaite Wallis, here shown at Aweme, Manitoba in 1956, collected three species of tiger beetles and 368 specimens in the vicinity of Fort Smith in 1950. These specimens found their way into most large collections in Canada but the largest part of the sample includes 350 specimens at CNC. The Wallis specimens from NT have been used extensively for teaching and research and were studied as part of the evaluation of hybridization in the duodecimguttata *group (Freitag 1965). Wallis is well known for his classic monograph of Canadian tiger beetles published in 1961. It was remarkable for the time in including colour illustrations of all of the species. Photograph taken 6 Oct 1956 by Ralph D. Bird (Can. Field- Nat. 86: 393. 1972). Permission to use it was kindly provided by well-known Canadian botanist C.D. (Charlie) Bird (who collected tiger beetles at Norman Wells in 1953).*

(NT); Mason & Hughes 1948 (YK); W.R.M. Mason 1948, 1949 (AK, NT, YK); P.F. Bruggemann 1949 (YK); E.F. Cashman 1949 (NT); S.D. Hicks 1949 (NT); ; D.L. Watson 1949 (NT); L.M. Fisher 1950 (YK); W.G. Helps 1950 (NT); J. McKay 1950 (NT); P. Rubtstoff 1950 (NT); W. Shaeffert 1950 (NT); J.B. Wallis 1950, 1951 (NT); P.R. Ehrlich 1951; J.E.H. Martin 1951; W.R.M. Mason 1951; C.D. Bird 1953; J.G. Chillicott 1953; H.J. Huckel 1955 (YK); R.B. Leech 1956, 1962 (YK); S.D. Hicks 1957 (NT); G.E. Shewell 1969 (NT); A. Smetana 1972 (NT); B.E. Bowen 1973 (NT); B.F. & J.L. Carr 1979, 1987, 1988 (NT, YK); D. Lafontaine 1980 (YK); M. Wood 1982 (YK); M. Polak, D.M. Wood 1989 (AK); and P.M. Catling 2003, 2004 (NT).

Interestingly a number of specimens in CNC bear old yellow labels with “NWT” or “NWT-J.M. 80" A few specimens of *C. limbata* in the collection with these labels provide a clue to their interpretation. The specimens belong to subspecies *nympha* of the prairie region and were evidently collected when “Northwest Territories” included much of what is now the prairie provinces and extended from the Dakotas to the Rockies.

Figure 3. In some places the open ground utilized by tiger beetles may be maintained by Wood Bison like this group on the west side of Great Slave Lake. Fire and drought on coarse substrates are also factors that prevent vegetation from closing in. Photo P.M. Catling 2003.

GATHERING INFORMATION

Since the ecology and distribution of tiger beetles is poorly understood in the north, new information in the form of specimens or photographs is welcome. With regard to photography the biggest difficulty is getting close. The easiest way to get a good photograph is to catch the beetle in a net, then place it in a small bottle and put it in the cooler overnight. It can be photographed during that cool period in early morning with blue sky providing optimal lighting. Habitat can be recreated in a cereal bowl (which can be later used for breakfast). When first removed from the bottle it will be slow and there will be a brief opportunity for a good photograph.

With regard to collecting, no more than five specimens need to be collected from any particular location. The specimens can be placed in any kind of envelope with data (location, date, collector) written on the envelope. The envelope can be placed in the freezer to kill the specimens. Envelopes can then be put in a dry place to allow specimens to dry out. This requires one or two weeks. To prevent crushing specimens should be placed in a box. Prior to killing, live beetles can be maintained in a bottle with moist tissue. Professional entomologists prefer to kill beetles (and other insects) with a few drops of ethyl acetate on tissue in a bottle with a tight fitting lid. The liquid is highly flammable (explodes into fire near a flame), very volatile and the vapour is toxic. Not surprisingly, keeping beetles alive until freezing and drying is possible is often a preferred method. Specimens can be shipped dried or frozen but should not be kept in an airtight container without first drying or continuous freezing so as to prevent rotting.

Soft-bodied larvae have to be dealt with differently. Older mature larvae are the most useful. They can be killed by immersion for 15 minutes in hot water (hot coffee temperature) which leaves them straight and full. They can then be placed in a bottle with 70% alcohol and a label written in pencil can be placed in the same bottle.

IDENTIFICATION

As a group tiger beetles are distinguished by their colour patterns and often iridescent colour above and below. There is no paint job in the world that can rival most of the species close-up in changing light. Other distinctive features are their long thin antennae, long body form with head wider than the thorax, long sickle-shaped mandibles with a few equally spaced teeth and long, thin legs. Tiger beetles often have pale front (shoulder or humeral area), middle and rear markings on the wing covers (actually hard front wings called elytra beneath which are the folded transparent wings used for flight). These markings are more or less distinctive in shape for the different species. Another useful feature is the numbers and types of hair-like setae on various parts of the body, especially the head. Older individuals may become bald so that a lack of hair is not always conclusive, but this is not likely to be a problem often. The most useful identification guides for Northwest Territories (in addition to the information provided here) are the books by Acorn (2001) and Pearson *et al.* (2006). Additional images of some of the species treated here may be viewed online (see Bousquet and Goulet 2004). For information on ecology and evolution, see Pearson and Vogler (2001). Freitag's (1999) catalogue includes valuable leads to many kinds of information.

IDENTIFICATION KEY FOR ADULT TIGER BEETLES OF NORTHWEST TERRITORIES (AND ADJACENT REGIONS)

(1) KEY EMPHASIZING MARKINGS (to be used with illustrations on front and back covers)

1a. Shoulder mark long and slanted straight backward beyond angle (elbow) on middle mark **2**
1b. Shoulder mark short, not extending straight backward beyond "elbow" on middle pale line, much shorter than the angle on middle mark and often curved forward at the tip ("C"- or "G"-shaped) **6**

2a. Angle of middle mark (elbow) prominent or expanded; pale marks often narrow and not connected along edge of wing covers . . . . . ***tranquebarica kirbyi***
2b. Angle of middle mark (elbow) not prominent or expanded or pale markings extensive and joined; pale markings narrow or broad, connected along margins of wing covers or not **3**

3a. Small and narrow, 8-12 mm long; with markings connected by an broad pale line on the margins of the wing covers . . . . . ***terricola terricola***
3b. Larger and with broader shoulders, 11-15 mm long, either lacking a wide marginal band or with it so wide as to join the marks leaving only a narrow central coloured area **4**

4a. Shoulder markings broader or as broad as the dark space between them and the middle pale markings; foot of middle mark line well developed . . . . . ***lengi versuta***
4b. Shoulder markings either narrower than the dark space between them and the middle pale markings or so wide as to join the marks leaving only a narrow central coloured area; foot of middle mark poorly developed **5**

5a Pale markings joined to extent of being 80 % pale . . . . . ***limbata nympha***
5b Pale markings separate, about 50 % pale . . . . . ***limbata hyperborea***

6a. Shoulder line transverse or directed forward , "G"-shaped . . . . . ***hirticollis athabascensis***
6b. Shoulder line a dot or a short backwardly projecting line, "C"-shaped **7**

7a. Central mark angled 45˚ beyond bend (elbow) **8**
7b. Central mark not angled beyond bend (elbow) but extending straight downward or less than 45˚ **11**

8a. Central mark short beyond angle (the distance from the foot to the basal mark to the spot of the basal mark as long as the downcurved segment of the middle mark - much shorter than in the similar *decemnotata*) . . . . . ***limbalis***
8b. Central mark long beyond angle **9**

9a. With hairs between eyes; middle and rear markings prominent . . . . . ***decemnotata***
9b. Lacking hairs between eyes; middle and rear markings very narrow or none **10**

10. Wing covers smooth and shiny with shallow pits . . . . . ***nebraskana***
10b. Wing covers rough and dull with low protuberances . . . . . ***longilabris***

11a. Cental mark not extending to edge of wing cover; spot of basal mark prominent or not; green, greenish-purple, or brown **12**
11b. Central mark usually extending to edge of wing cover (not always in eastern *duodecimguttata*); spot of basal mark not prominent; brown **13**

12a. Spots of basal marks prominent, each 1/4 the width of the wing cover . . . . . ***decemnotata***
12b. Spots of basal marks not prominent, less than 1/6 the width of the wing cover **13**

13a. Angle (elbow) of middle mark not prominent or abrupt and middle mark somewhat angled below elbow
. . . . . ***depressula***
13b. Angle (elbow) of middle mark prominent or abrupt and middle mark directed straight downward from elbow **14**

14a. Thorax squarish, about as long as wide; front (shoulder mark usually continuous
. . . . . ***repanda***
14b. Thorax trapezoidal and wider than long (and wider at front than at back); front (shoulder) mark usually separate spots **15**

15a. 20-30 hairs between eyes; white line along part of edge of wing cover, central mark often broken (but less often in western than eastern populations) . . . . . ***duodecimguttata***
15b. 0-5 hairs between eyes; no white line on edge of wing cover, central line complete . . . . . ***oregona gutiffera***

(2) KEY EMPHASIZING MORPHOLOGICAL CHARACTERISTICS

1a. Lacking hair between the eyes **2**
1b. With many hairs near the anterior edge of each eye and/or between the eyes **4**

2a. Labrum shorter than wide; smaller, 8-12 mm long, relatively narrow with narrow shoulders; pale marks well developed . . . . . ***terricola terricola***
2b. Labrum longer than wide; larger, 12-15 mm long, with broader shoulders; pale marks very restricted **3**

3a. Wing covers shiny with low, rounded projections . . . . . ***nebraskana***

3b. Wing covers not shiny or granular-shiny with a prominent rough surface of projections and punctures . . . . . ***longilabris***

4a. Hairs only near the outer edge of each eye, not scattered between eyes **5**
4b. Hairs frequent and scattered between the eyes **6**

5a. With 2-3 hairs above each eye . . . . . ***depressula***
5b. With 8-11 hairs above each eye . . . . . ***oregona***

6a. Hair on the head and body lying flat or decurved *7*
6b. Hair on the head and body erect **8**

7a. Pale markings joined to extent of being 80 % pale . . . . . ***limbata nympha***
7b. Pale markings separate, about 50 % pale . . . . . ***limbata hyperborea***

8a. Upper lip (labrum) with three teeth on central lower edge; wing covers not or less obviously serrate at the tip **9**
8b. Upper lip (labrum) with one tooth on central lower edge or no teeth; wing covers clearly serrate at the tip **12**

9a. Shoulder mark (humeral lunule) absent or reduced to two spots **10**
9b. Shoulder mark (humeral lunule) long and oblique **11**

10a. Downward arm of middle band of wing cover short . . . . . ***limbalis***
10. Downward arm of middle band of wing cover long . . . . . ***decemnotata***

11a. Upper marginal pale line not complete; light markings less than 40 % of surface . . . . . ***tranquebarica kirbyi***
11b. Upper marginal line complete; light markings more than 50% of surface . . . . ***lengi versuta***

12a. Pale areas of wing cover reduced, the shoulder marking never more than two dots; first antennal segment with 3 long hairs **13**
12b. Pale areas of wing covers complete and shoulder spot part of a complete marginal line; first antennal segment with 3-5 long hairs **14**

13a. Front maculation complete; pronotum rectangular and squarish, length/width = 4/5 . . . . . ***repanda***
13b. Front maculation broken; pronotum trapezoidal and wider frontally, length/width = 4/6 . . . . . ***duodecimguttata***

14a. Shoulder spot confluent with marginal line and not in the form of a "C" (*limbata*) **7**
14b. Shoulder spot more or less distinct and forming a more or less distinct inverted "C" . . . . . ***hirticollis athabascensis***

Figure 4. Open sandy areas such as this knoll in Jack Pine forest near Fort Smith are home to C. longilabris *and* C. limbata hyperborea*. Photo P.M. Catling 2003.*

SPECIES DISTRIBUTIONS AND STATUS IN NORTHWEST TERRITORIES

For each of six species and one hybrid there follows a distribution map based on specimens in CNC (the Canadian National Collection of Insects maintained by Agriculture and Agri-Food Canada on the Central Experimental Farm in Ottawa). The accompanying paragraph includes notes on conservation status and taxonomic status.

The ranking system (Carrière and Lange 2002) utilizes, when available, information on population size, trends and threats to habitat, but this kind of information is often not available for insects. Consequently ranking relies heavily on probable size of range and number of

occurrences. Range is considered in terms of the proportion of the continental area of Northwest Territories. There is some arbitariness in determining the range by delineating a series of points and part of any delineated area may be unsuitable for occupancy so that the areas determined are to be considered both maximum and approximate. Number of occurrences is best considered in light of total occurrences. An occurrence or location is here defined as a geographic location for a species that is removed by at least 1 km from any other such location. In the Northwest Territories tiger beetles have been recorded at 22 locations (Figure 1). Any species recorded from less than 2 locations, especially if they were close together and represented a relatively small percentage of the jurisdictional area, would seem worthy of an S2 rank. However this rank denotes species that are clear candidates for a detailed risk assessment. Lacking specific information on trend and threat, this rank cannot be applied but there is little reason to suspect decline and also little reason to suspect threat. Assuming lack of threat and decline, the species can be ranked, but S2 is inappropriate (due to lack of threat or decline). Thus for species with a very restricted distribution S3 seems most appropriate. This rank indicates species that "are not believed to be at risk of extirpation or extinction, but that may require special attention or protection to prevent them from becoming at risk" (Carrière and Lange 2002). This category describes species that have medium priority for consideration.

Using the database table of 306 distinct (species, location, date, observer) records in ARVIEW-GIS, maps were produced showing occurrences. Approximate distribution areas were then calculated by enclosing occurrences in a polygon for which area was automatically calculated. This area was then expressed as a percentage of the continental Northwest Territories land surface.

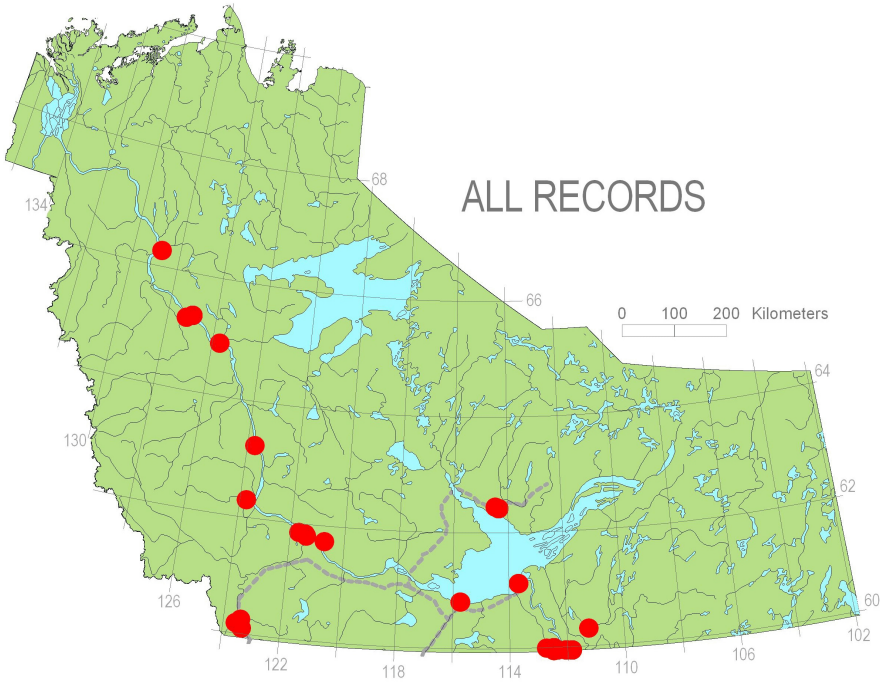


Figure 4. Locations where tiger beetles have been collected in Northwest Territories.

Cicindela duodecimguttata Dejean, TWELVE SPOTTED TIGER BEETLE S4

This species is frequently encountered in moist, open areas along sandy shorelines of rivers and lakes. It has an extensive range covering a large portion of North America. It reaches its northern limit in Northwest Territories further to the north than that shown on most range maps (e.g Pearson et al. 2006).

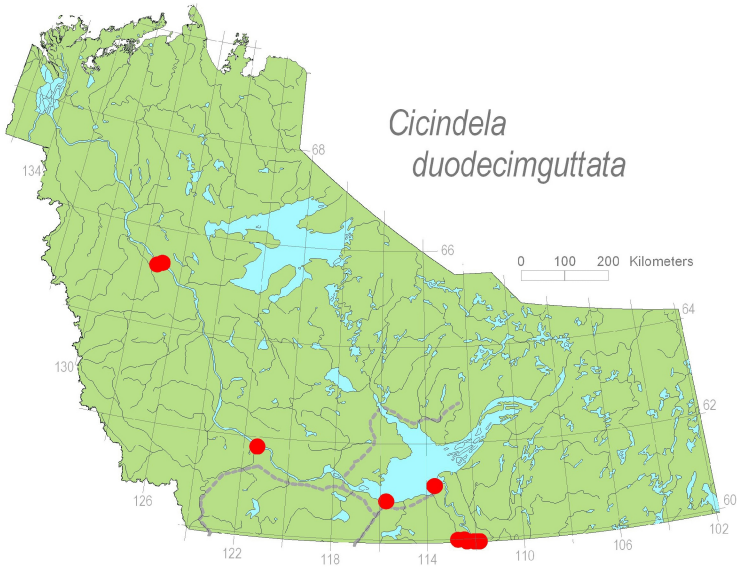
Some of the material databased and mapped was determined as *C. oregona guttifera* X *duodecimguttata* by Freitag. All of these specimens differ from *oregona* as defined in some keys (Wallis 1961, Pearson et al. 2006) in having 15-30 hairs between the eyes. Many of the specimens differ from the material accepted as *C. duodecimguttata* only in the less restricted pale marking and a slightly more abrupt "elbow" on the middle line of the wing cover. However, clear groups do not exist and specimens assigned to either species have been found by the same collector on the same date at the same location. Completely distinct hybrids have a more restricted distribution shown with a separate map following.

Specimens of *C. duodecimguttata* from Northwest Territories resemble some from the Great Plains in their complete markings and relatively narrow pronotum. All specimens from Northwest Territories that I have seen that were possibly referable to *C. repanda* on the basis of maculation had the maximum width/length of pronotum greater than 2.3 as well as abundant hair between the eyes suggesting that they should be placed with *C. duodecimguttata* despite the fact that some have the central line and shoulder line complete as is usually the case with *C. oregona guttifera*.

General locations: Fort Smith area, Fort Simpson, Taltson River, Yellowknife, Fort Liard, Norman Wells, Canol, Resolution, Hay River

Number of occurrences: 11

Distribution: 57,204 square miles, 148,157 square km, 12.9 %



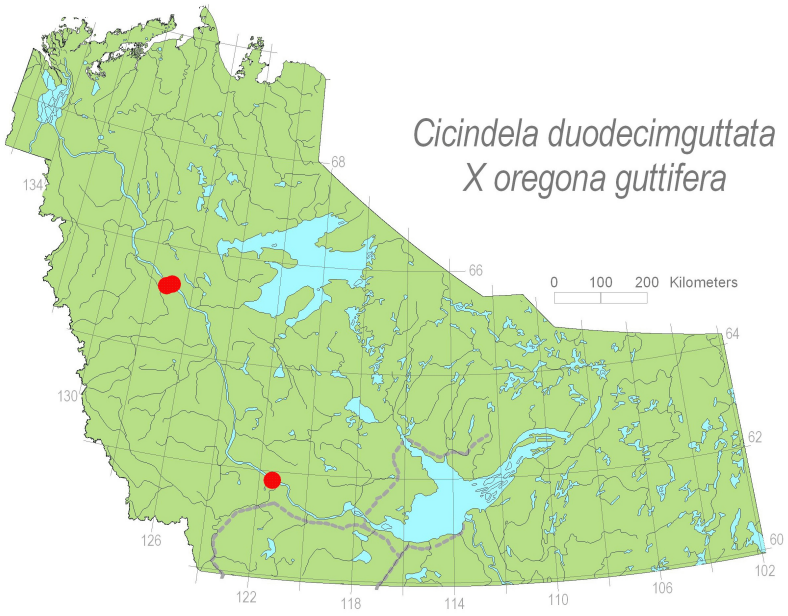
Cicindela duodecimguttata Dejean X ***oregona*** Dejean ***guttifera*** LeConte
TWELVE SPOTTED HYBRID TIGER BEETLE S4

Freitag (1965) published a detailed study of hybridization in these species. At Norman Wells he found the only population that was comprised mostly of hybrids. At this location only 6.9 % were referable to one or the other parent. The influence of hybridization diminished eastwards. A population sample from Fort Smith was found to be referable to *C. duodecimguttata* with introgression of *C. oregona guttifera*.. The particularly well established hybrid populations in the Mackenzie valley are of interest with regard to evolution and evolutionary history in this group and also represent unique and restricted genetic variants.

General locations: Norman Wells, Fort Simpson and Canol

Number of occurrences: 3

Distribution: 1,743 square miles, 4514 square km, 0.39 %



Cicindela limbalis Klug, COMMON CLAYBANK TIGER BEETLE S4

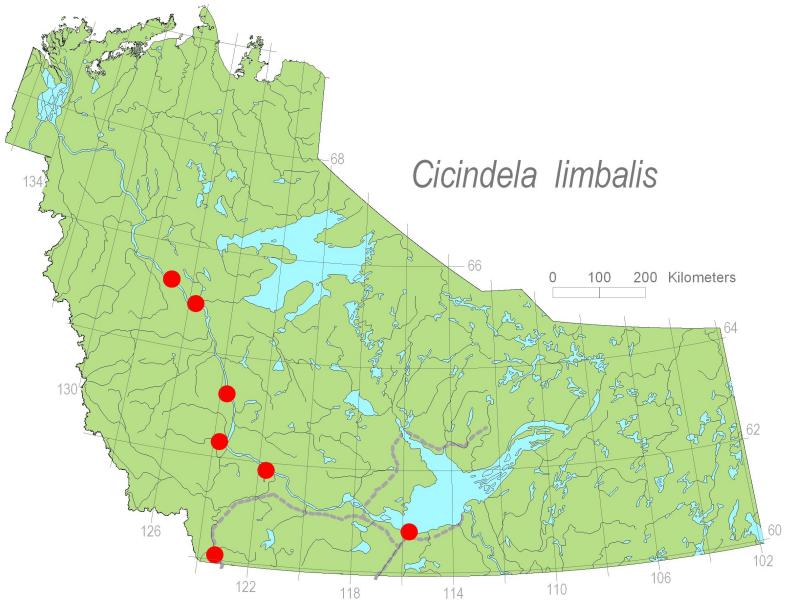
Often encountered in open areas with fine textured substrate such as clay or eroded limestone, this species usually positions its larval burrows on steep clay banks. Northern populations are more greenish (see cover) and have been distinguished as subspecies *spreta* LeConte, but the differences are regarded as slight and a northwestern subspecies is generally not recognized (Wallis 1961, p. 42, Pearson *et al.* 2006).

Although widespread, this species is rather habitat-restricted and not always as common as the common name implies. It is said to be extirpated in southern New England except for a population on legendary Block Island (the last stand of the North American Burying Beetle in the east).

General locations: Norman Wells, Hay River, Martin River, Fort Wrigley, Fort Liard, Fort Simpson

Number of occurrences: 7

Distribution: 36,869 square miles, 95,490 square km, 8.3 %



The species is found in dry sandy blow out dunes, often far from water. It has a primarily prairie distribtuion. The subspecies *hyperborea* is small, dark reddish-brown or occasionally bluish or reddish-bronze and with less extensive maculation than subspecies *nympha* of the northern Great Plains (which is disjunct in northwestern Alaska and may be associated with extensive areas of pure blowing sand). Subspecies *hyperborea* has a generally restricted distribution being endemic to northern Canadian zone of Saskatchewan (Hooper 1969), northwestern Alberta (Acorn 2001) and the Fort Smith area of Northwest Territories. Of 22 localities in Northwwest Territories where Tiger Beetles have been found, this one has only been found in the vicinity of Fort Smith. Its limited overall distribution as well as its very limited occurrence in Northwest Territories make it a species of particular interest. Based on current knowledge this subspecies might be regarded as an endemic of the northwestern boreal forest.

In 1950, 80 individuals were collected at Fort Smith throughout the summer by W. Schaeffert, J.B. Wallis and W.G. Helps. They were found from 24 May until 29 August with the largest numbers collected in late July.

The related but more isolated *C. limbata labradorensis* at Goose Bay, Labrador may be a recent introduction by man or a periglacial relict (Larson 1986) worthy of recognition as a distinct subspecies (Johnson 1989).

General locations: Fort Smith

Number of occurrences: 1

Distribution: less than10 square miles, less than 25.9 square km, 0.002 %

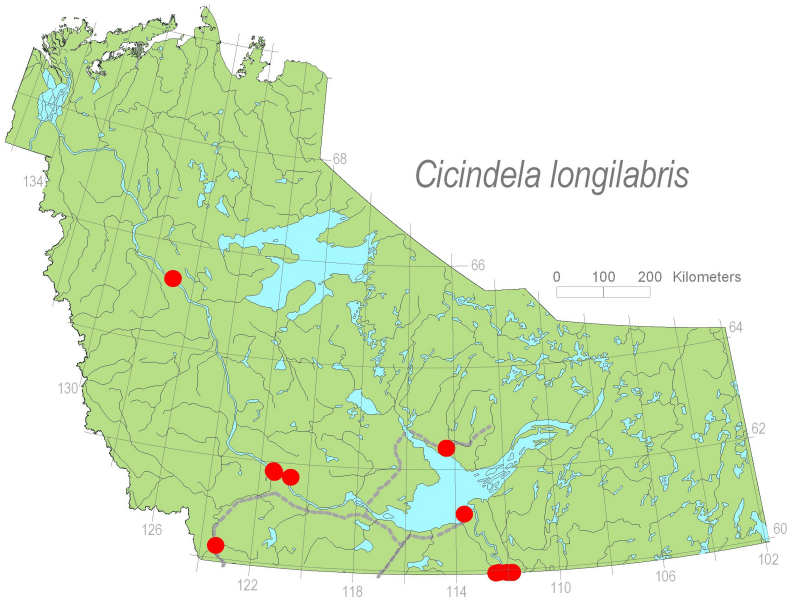
Cicindela longilabris Say ***longilabris***, BOREAL LONG-LIPPED TIGER BEETLE S4

Specimens from Northwest Territories are black like most from the boreal forest, but in the serpentine mountains of eastern Canada in Newfoundland, Gaspé and Labrador they are bright green. In the western mountains various subspecies are bronze or olive-green. This species is often found in sandy areas within Jack Pine forest, where the beetles may benefit from looking a little like black bits of pine charcoal, but this northern species may also benefit by warmth from its black colouration (see discussion in Acorn 2001).

General Locations: Muskeg River near Fort Liard, Fort Smith area, Yellowknife, Resolution, Norman Wells

Number of occurrences: 9

Distribution: 86,630 square miles, 224,370 square km, 19.6 %



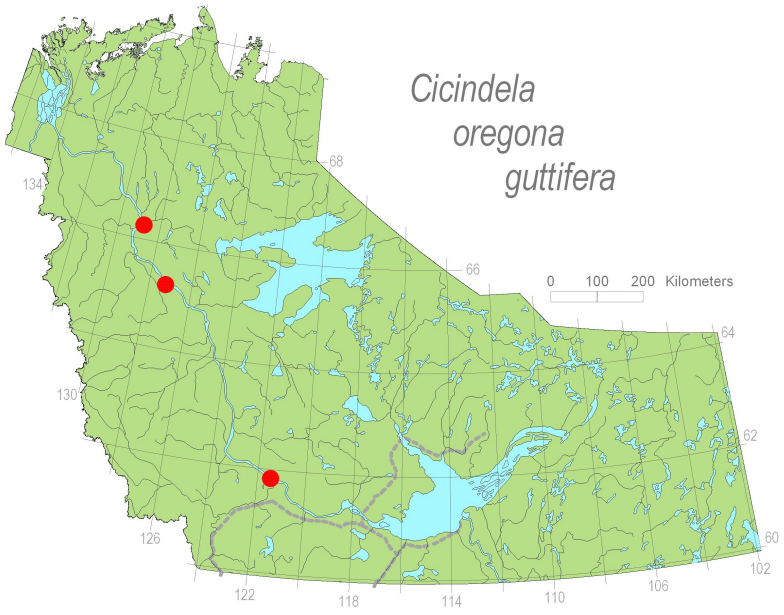
Cicindela oregona Dejean ***guttifera*** LeConte, WESTERN TIGER BEETLE S4

A species of the open, gravelly shores of mountain streams, this one occurs mainly in the western mountains. It is confined in Northwest Territories to the Mackenzie valley region where reported by Freitag (1965) to hybridize with *C. duodecimguttata.*

General Locations: Norman Wells, Canol, Fort Good Hope and the South Nahanni River

Number of occurrences: 4

Distribution: 5,359 square miles, 13,879 square km, 1.2 %



Cicindela tranquebarica Herbst ***kirbyi*** LeConte, OBLIQUE-LINED TIGER BEETLE S4

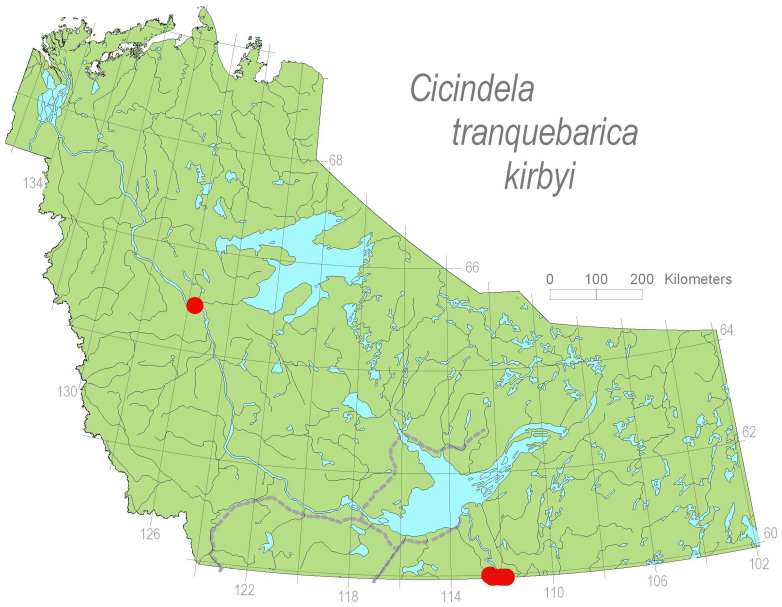
This species occurs in a greater variety of habitats (mud, sand, clay, saltflats) than some of the other species. Many have been collected on the Salt Plains W of Fort Smith and elsewhere in the vicinity. It appears to be locally common in that area despite a restricted distribution in Northwest Territories. More information on its occurrence at Norman Wells is needed. A single specimen was collected here by C.H. Crickmay on 14 August 1922. It is correctly identified and there is no particular reason to suspect a labelling error.

The subspecies *borealis* Harris has been reported from Northwest Territories by Bousquet (1991) but is a weakly defined subspecies and not shown to occur in the region by Pearson et al. (2006). A few specimens, including the one from Norman Wells, have the thin maculations characteristic of this subspecies.

General Locations: Fort Smith area and Salt Plains to the west, Fort Norman (Norman Wells).

Number of occurrences: 4

Distribution: 6,000 square miles, 15,539 square km, 1.3 %



TIGER BEETLES OF ADJACENT AND/OR NORTHERN REGIONS

Tiger beetles extend much further north in western Canada than in eastern Canada. Larochelle (1974) reports the northernmost records for Quebec as *Cicindela longilabris* and *Cicindela tranquebarica*, both at 51˚ 30' N near Fort Rupert in Mistassini Territory. In adjacent Yukon 5 species of tiger beetles have been recorded and there are 6 in Alaska (Bousquet 1991, Bousquet and Larochelle 1993, Freitag 1999, CNC, Table 1). *Cicindela decemnotata* and *C. terricola terricola* from Yukon have not been found in Northwest Territories and are perhaps relicts of the once widespread Mammoth Steppe, as is subspecies *nympha* of *C. limbata* which is disjunct in northwestern Alaska. There are no records of tiger beetles from Nunavut. Some of the following species may exist as isolated disjuncts in parts of the Northwest Territories. Listed below are species that occur south of 60˚ N and west of Northwest Territories.

Cicindela decemnotata Say, BADLANDS TIGER BEETLE

This species is disjunct from the prairies to the Whitehorse and Kluane regions of Yukon (specimens at CNC) and also in eastern Alaska.

Cicindela hirticollis Say ***athabascensis*** Graves, HAIRY-NECKED TIGER BEETLE

The active dunes on Lake Athabasca where this and other tiger beetles occur (see Acorn 1994) are close to Northwest Territories.

Cicindela lengi W. Horn ***versuta*** Casey, BLOWOUT TIGER BEETLE

This prairie species occurs in northern Saskatchewan and Alberta and very near to the Northwest Territories in the Lake Athabasca sand dunes (Acorn 1994).

Cicindela limbata Say ***nympha*** Casey, SANDY TIGER BEETLE

As noted by Pearson et al. (2006) a population disjunct from the prairie region that is apparently referable to *nympha* occurs in the Nogahabara dunes of northwestern Alaska (specimens at CNC) and it is also reported from the Great Kobuk dunes north of the Arctic Circle near Kobuk, Alaska (Pearson *et al.* 2006).

Cicindela nebraskana Casey, PRAIRIE LONG-LIPPED TIGER BEETLE

Although mapped for the Yukon by Wallis (as *C. montana)* and with reference to occurrence in Yukon, I have seen no correctly determined specimens. Two specimens collected by Wood on Carcross dunes and determined as this species have the surface of the wing covers rough with protuberances rather than smooth with shallow pits. They are thus placed with *C. longilabris* Some of the other characters used to identify *C. nebraskana* in the south such as the black underside (Acorn 2001) do not seem to work as well in the north.

Cicindela repanda Dejean, BRONZED TIGER BEETLE

This species occurs in northern Alberta and Saskatchewan. Sixty degrees is 150 km N of limit shown by Pearson et al. (2006) and Wallis (1961). Although reported from Northwest Territories by Bousquet (1991), Bousquet and Larochelle (1993) and Freitag (1999), I have not seen justifying specimens. See also notes on *C. duodecimguttata* above.

Cicendela terricola Say ***terricola***, GRASS-RUNNER or VARIABLE TIGER BEETLE

(= *C. cinctpennis, C. pusilla cinctipennis*)

Widespread in the prairie region, isolated disjunct populations of the nominate subspecies

from the Great Plains exist in west central Alberta and in Yukon near Whitehorse. This is a small species 8-10 mm long. The northwestern populations have pitted wing covers and are considered a separate species (*C. pusilla* Say) by some authors but not Pearson *et al.* (2006).

TABLE 1. CHECKLIST OF TIGER BEETLES OF NORTHWESTERN NORTH AMERICA NORTH OF 60˚ (ALASKA, YUKON AND NORTHWEST TERRITORIES). Ranks are: 2 = at risk (species that may be at risk of extirpation or extinction and are therefore candidates for a detailed risk assessment; 3 = sensitive (species that is believed not to be at risk of extirpation or extinction, but that may require special attention or protection to prevent them from becoming at risk; 4 = secure (species which are not believed to be at risk or sensitive); 5 = undetermined (species for which insufficient data, information, or knowledge is available to reliably evaluate their status).

Scientific Name	Common Name	AK	YU	NT	NU
Cicindela longilabris Say	BOREAL LONG-LIPPED TIGER BEETLE widespread	6	4	4	-
Cicindela duodecimguttata Dejean	TWELVE-SPOTTED TIGER BEETLE S side of Great Slave Lake	-	-	3	-
Cicindela oregona Dejean ***guttifera*** LeConte	WESTERN TIGER BEETLE MacKenzie valley	6	4	5	-
Cicindela limbata Say ***hyperborea*** LeConte	SANDY TIGER BEETLE confined to northern Alberta, northern Saskatchewan and adjacent Northwest Territories	-	-	4	-
Cicindela limbata Say ***nympha*** Casey	SANDY TIGER BEETLE N of 60 confined to northwestern Alaska	6	-	-	-
Cicindela limbalis Klug	COMMON CLAYBANK TIGER BEETLE lower MacKenzie valley	-	-	4	-
Cicindela decemnotata Say	BADLANDS TIGER BEETLE in central Yukon	6	4	-	-
Cicindela terricola Say ***terricola***	GRASS-RUNNER TIGER BEETLE	-	3	-	-
Cicindela tranquebarica Herbst ***kirbyi*** LeConte	OBLIQUE-LINED TIGER BEETLE southwestern NT border	-	2	4	-
Cicindela depressula Casey ***depressula***	DISPIRITED TIGER BEETLE montane subspecies from Haines area of Alaska sothward	6	-	-	-
Cicindela depressula Casey ***eureka*** Fall	DISPIRITED TIGER BEETLE coastal subspecies from Haines area of Alaska southward	6	-	-	-

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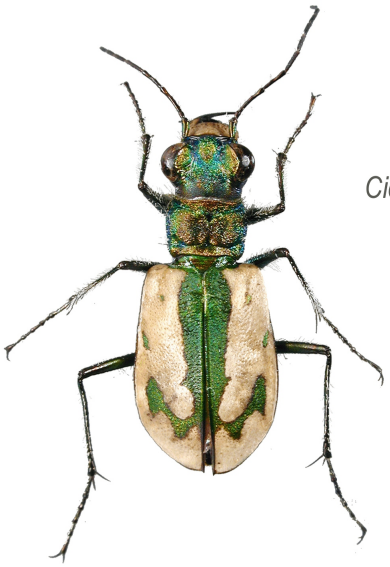
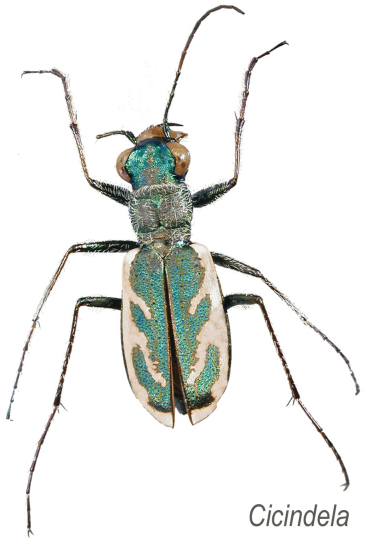
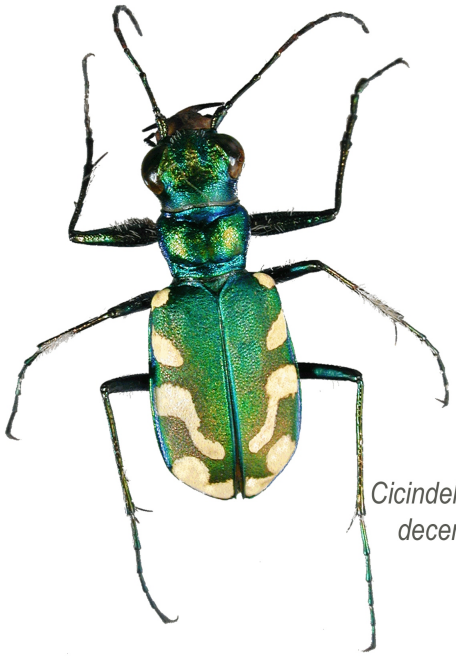


Cicindela limbata nympha



Cicindela terricola terricola



Cicindela decemnotata

10 mm