THE UNIVERSITY OF MANITOBA

LIFE HISTORY PARAMETERS OF A POPULATION OF RED-SIDED GARTER SNAKES (*THAMNOPHIS SIRTALIS PARIETALIS*) ADAPTED TO A RIGOROUS AND FLUCTUATING ENVIRONMENT

by

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ABSTRACT

The red-sided garter snake, *Thamnophis sirtalis parietalis*, approaches the northern limit of its range in the Interlake of Manitoba, Canada. Although the climate is extreme and variable, the species is abundant in this region. The main objective of this study was to explain this abundance in ecological terms.

Denning populations of *T. sirtalis* are large, but susceptible to great fluctuation in size. Population declines may occur because of reproductive failure in response to poor weather conditions, rather than because of variable survivorship of adults. Growth of juvenile snakes is sufficiently rapid that first reproduction usually takes place in the second year of life. Reproductive potential is apparently higher than in more southerly populations, although considerable loss of potential may take place during gestation. It is suggested that *T. sirtalis* resembles an "r-selected" species throughout its range and that the characteristics of such species are particularly well-developed in the Interlake populations.

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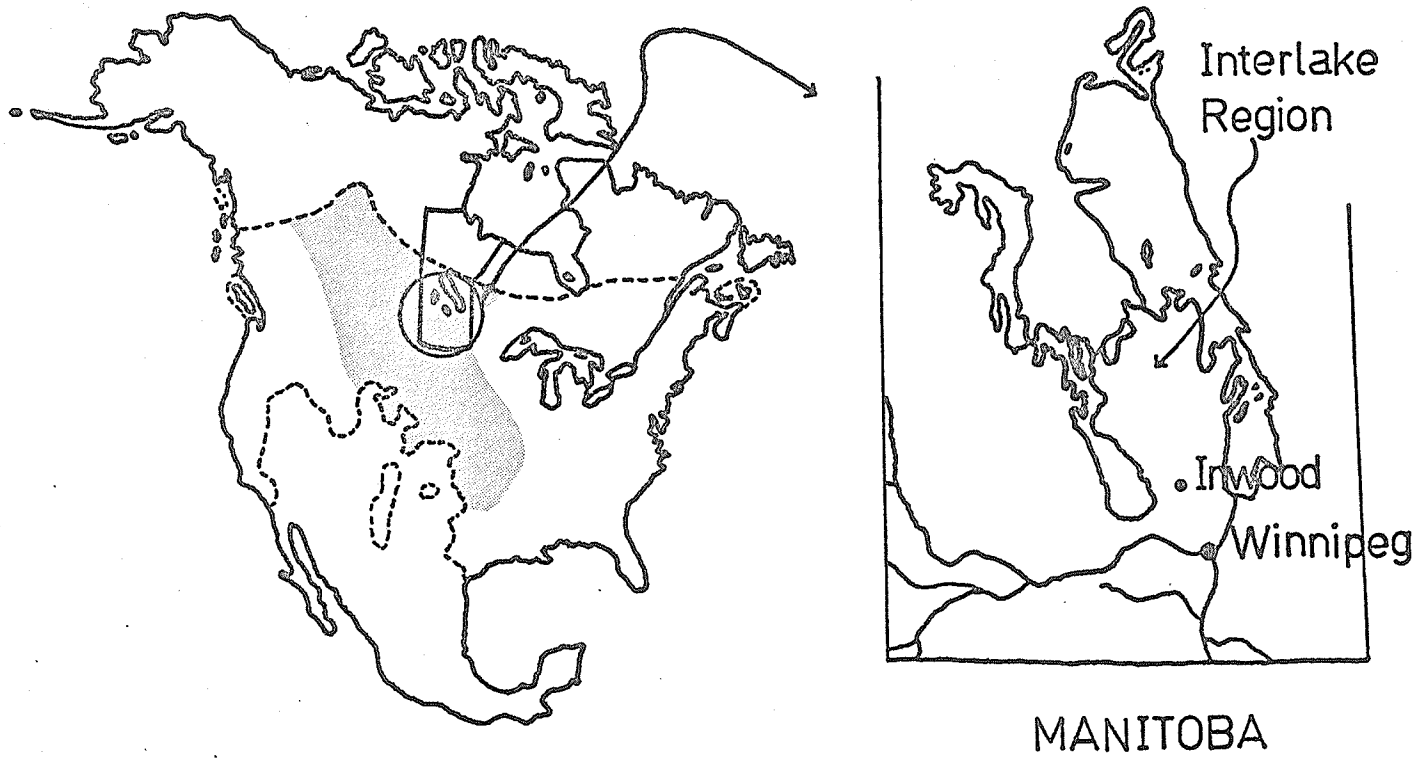
INTRODUCTION

The climate in the Interlake region of Manitoba is a distinctly rigorous one for a reptile, the long winter resulting in a very short growing season during which daily variations in temperature may be quite severe. The red-sided garter snake, *Thamnophis sirtalis parietalis*, approaches the northern limit of its distribution in this area (Fig. 1). The short growing season is apparently reflected in the annual cycle of these snakes. Six or more months of the year are spent in hibernation and only about three seem to be spent away from hibernacula (Gregory, 1971). In more southerly areas, the growing season is longer (Carpenter, 1952a; Platt, 1970).

Despite this, *T. sirtalis* appears to be a very abundant species in the Interlake, although large fluctuations in population size seem to take place. Young snakes are rarely seen, but the adults are particularly evident in spring and fall because of their habit of overwintering in large communal aggregations at traditional hibernacula or dens. The snakes are active in the vicinity of the dens for as much as one and one-half or two months each spring and fall. These den populations may number in the thousands in some cases (Gregory, 1971). This impression

Fig. 1 Map of North America showing distribution of *Thamnophis sirtalis* and study area in Manitoba. Dotted line indicates range of *T. sirtalis* and shaded area range of subspecies *parietalis* (after Fitch, 1965: 504).


Interlake
Region
Inwood
Winnipeg
MANITOBA

of abundance is further reinforced at these times of year by the mass migrations that the snakes undertake when dispersing to marshes in the summer and returning in the fall. Neither such large overwintering populations nor such large-scale movements are known for the same species at lower latitudes.

These considerations suggest that the Interlake red-sided garter snake populations might represent a system for the study of ecological adaptation to a northern and nearly limiting environment. The relative wealth of literature (Carpenter, 1952b; Fitch, 1965; Platt, 1970) concerning the ecology of the species further south provides a suitable basis for comparison. Also, the presence of large, virtually non-interchanging populations at discrete denning areas (Gregory, 1971) affords a unique opportunity to investigate in detail the long-term population dynamics of this species. The following questions were of particular interest in this study:

1. Do population sizes fluctuate as greatly as appears to be the case? This has often been felt to be a characteristic of northern animal populations but it may well apply to *T. sirtalis* in general (Fitch, 1965; Platt, 1970). Do any changes in survivorship, fecundity, and sex or age composition accompany such

fluctuations and what might be their causes?

2. Are growth, fecundity, and age of first reproduction comparable with those of more southerly populations? Are such differences as might occur related to differences in reproductive strategies of the kinds shown for lizards (Tinkle, 1969; Tinkle *et al*, 1970)?
3. Does reproduction in individual females follow a cycle of two or more years as is the case for many species of snakes inhabiting high altitude or latitude localities (Rahn, 1942; St. Girons, 1957; Prestt, 1971)?

In addition to answering the above questions, a further objective of this study was to gather information concerning various aspects of the previously uninvestigated summer phase of the annual cycle of this species in the Interlake. The main points of interest were distances and direction of summer dispersal and food habits.

MATERIALS AND METHODS

A. THE STUDY AREA

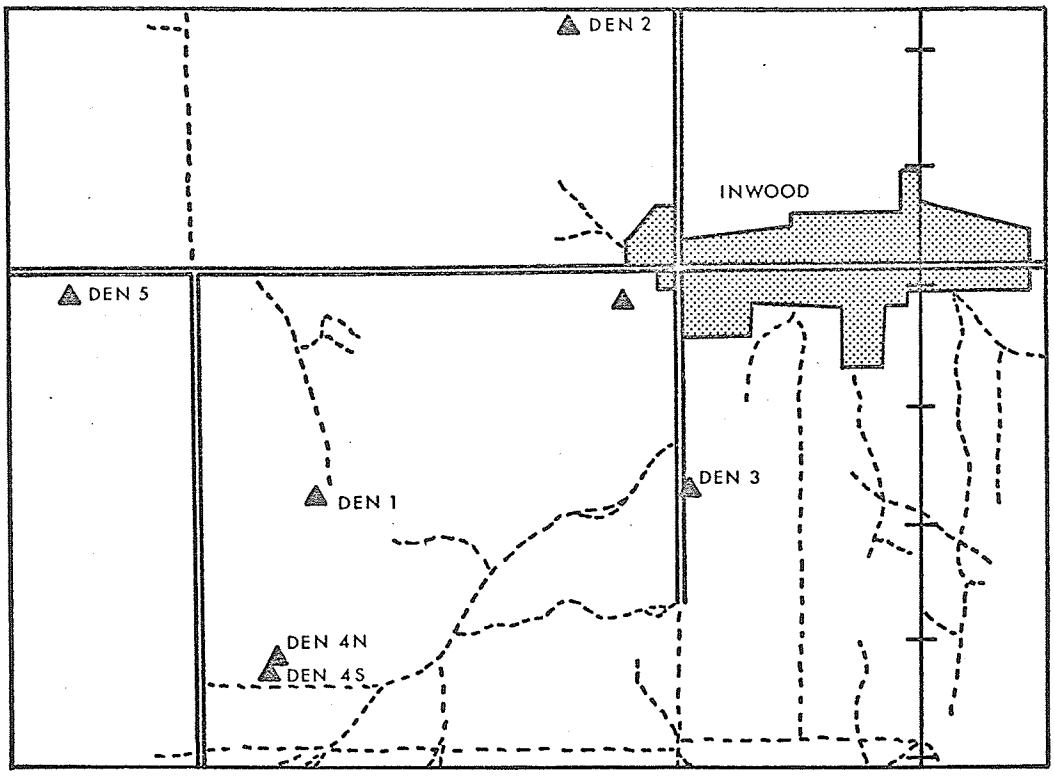
This study was carried out in the Interlake region of Manitoba, in an area centred around the town of Inwood, about 71 km. northwest of Winnipeg (Fig. 1). This is the same study site as described in Gregory (1971).

The area consists of a system of alternating linear ridges and depressions oriented in a northwest-southeast direction. The depressions are mainly occupied by marshes (Fig. 2), with small lakes or ponds in the middle of the larger marshes. The ridges are forested and consist of fissured limestone outcrop which often slumps into subterranean caves forming "sinks" and providing access underground. *T. sirtalis* uses these sinks as dens.

Inwood lies on one of the more southerly of these ridges. The area immediately around the town is dotted with hibernacula of varying sizes (Fig. 3), several of these apparently having been used for many years. An example of such a hibernaculum, and the one which has been studied most intensively, is den one (Fig. 3). This den consists of a large, oval-shaped limestone sink about 20 m. in length by 12 m. wide and 3 m. deep (Fig. 4). The bottom of this bowl-like depression is well-fissured and littered with broken-up pieces of rock.

Fig. 2 Photograph of typical marsh in Interlake.

Fig. 3 Map of Inwood area showing distribution of known dens.



LEGEND

ROAD

RAILROAD

TRAIL

DEN

SCALE

1 KM

N

Fig. 4 Photograph of den one.