KSC TR 51-2, Vol. III, Part 2
July 1980

(NASA-CR-163122) A CONTINUATION OF BASE-LINE STUDIES FOR ENVIRONMENTALLY MONITORING SPACE TRANSPORATION SYSTEMS AT JOHN F. KENNEDY SPACE CENTER. VOLUME 3, PART 2: (University of Central Florida) N80-28940 Unclas G3/45 28167

NASA Contract Report 163122

A Continuation of Base-Line Studies for Environmentally Monitoring Space Transportation Systems at John F. Kennedy Space Center

Ichthyological Studies: Sailfin Molly Reproduction Study

National Aeronautics and Space Administration

John F. Kennedy Space Center

NASA

VOLUME III: PART 2
OF THE
FINAL REPORT
TO THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN F. KENNEDY SPACE CENTER

A CONTINUATION OF BASE-LINE STUDIES FOR ENVIRONMENTALLY MONITORING SPACE TRANSPORTATION SYSTEMS (STS) AT JOHN F. KENNEDY SPACE CENTER

CONTRACT NO. NAS 10-8986

VOLUME III OF IV: PART 2 - ICHTHYOLOGICAL STUDIES,
Sailfin Molly Reproduction Study

PRINCIPAL INVESTIGATOR: F. F. SNELSON, Jr.

August 17, 1979

UNIVERSITY OF CENTRAL FLORIDA
P. O. BOX 25000
ORLANDO, FLORIDA 32816

BIOMEDICAL OFFICE
BIOSCIENCE OPERATIONS
CODE MD-B
JOHN F. KENNEDY SPACE CENTER
NASA

PREFACE

This document is part of a University of Central Florida contract report, "A Continuation of Base-Line Studies for Environmentally Monitoring Space Transportation Systems at John F. Kennedy Space Center."

The entire report consists of four volumes and an executive summary, all identified as KSC TR 51-2; NASA CR 163122:

Volume I: Terrestrial Community Analysis

Volume II: Chemical Studies of Rainfall and Soil Analysis

Volume III: Part I--Ichthyological Studies, Ichthyological Survey of Lagoonal Waters; Part II--Ichthyological Studies, Sailfin Molly Reproduction Study

Volume IV: Part I--Threatened and Endangered Species of the Kennedy Space Center: Marine Turtle Studies; Part II--Threatened and Endangered Species of the Kennedy Space Center: Threatened and Endangered Birds and Other Threatened and Endangered Forms

Executive Summary

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES
(Continued)

LIST OF FIGURES
(Continued)

SAILFIN MOLLY REPRODUCTION STUDY

Introduction

In recent years, ecologists have emphasized that deleterious changes in the environment of an organism do not always result in overt responses such as mortality or mass exodus from an affected area. In many cases, the organism responds in more subtle ways, through changes in behavior patterns, physiological mechanisms, demographic parameters, or niche requirements. Such subtle changes might go unnoticed by the casual observer, but may have insidious consequences for the species in the long term.

Certainly, one of the best studied and most infamous examples of the matter in question deals with the recent world-wide decline in populations of many species of raptorial and fish-eating birds (see Stickel, 1973, for a review). The accumulation of residues of DDT and other persistent chlorinated hydrocarbon compounds in the environments seems to have relatively little overt effect on these birds once they are fledged. As free-living predators, however, they ingest these compounds in their food, and the concentration of residues in the adult often is sufficient to cause insidious alterations in the physiological process (primarily calcium metabolism) of egg shell formation, resulting in a shell much thinner than normal. When the adult bird attempts to incubate its eggs, the thin egg shells are often broken by the weight of the parent, and the embryos die. The consequence of this phenomenon, and possible related changes in nesting behavior, is a dramatic reduction in the frequency of successful fledging in many populations.

There currently is great interest in developing techniques to detect, monitor, and assay the sublethal responses of organisms to environmental alteration. A few examples from fishes will illustrate recent trends. Foster et al. (1966) studied how the behavior of the flagfish, Jordanella floridae, was modified by sublethal concentrations of alkylbenzene sulfonate (ABS), a constituent of "hard" detergents. They demonstrated a fundamental change in feeding behavior after as little as four days exposure. Later, they found a dramatic suppression of egg production with (calculated) concentrations of ABS as low as 11.5 ppm in static aquarium bioassays (Foster et al., 1969).

The extreme toxicity of the insecticide Dieldrin to aquatic organisms has been widely recorded. Harrington and Bidlingmayer (1958) documented the devastating effect of an aerial Dieldrin treatment on fishes and invertebrates in a Florida salt marsh. More recently, chronic effects of very low Dieldrin concentrations have become evident. Lane and Livingston (1970) demonstrated total mortality in Poecilia latipinna from Dieldrin treatments of 12 and 6 ppb. Over half of their experimental fish survived treatments of 1.5 and 0.75 ppb, but the growth and reproduction of the survivors was affected adversely. Cairns and Scheier (1964) reported that the sunfish Lepomis gibbosus, exposed to 1.7 ppb Dieldrin for 12 weeks, had higher oxygen consumption and poorer swimming ability than control fish.

Finally, the sublethal effects of heavy metals on fishes have received considerable attention in recent years. For example, Brungs (1969) exposed fathead minnows (Pimephales promelas) to sublethal concentrations of zinc. He showed that the various test concentrations had no effect on growth, survival, or maturation, but almost totally inhibited reproduction. Spawning frequency was greatly reduced, and the number of eggs laid per female was dramatically lower in those fish exposed to zinc. Benoit and Holcombe (1978) later showed that zinc severely reduced egg adhesiveness and increased the fragility of the chorion membrane, both factors contributing to unsuccessful reproduction.

The overall objective of this study was to learn as much as possible about the reproduction of field populations of a test fish in the KSC area. These data would constitute a "before" baseline on reproductive performance in the selected species. By monitoring reproduction during and after the initiation of space shuttle operations, it was hoped, it would be possible to compare "after" reproductive patterns in order to identify any subtle deleterious environmental changes.

The sailfin molly, Poecilia latipinna, was selected as the "test" species for several reasons. (1) Snelson (1976) showed that this species was abundant on Merritt Island and distributed in all types of habitats and, thus, was "representative" of the Island's rather depauparate fish fauna. (2) Although not much was known about the details of reproduction in the species (Hubbs, 1964; Snelson, 1976), it is a member of the well-studied family Poeciliidae. (3) Because of its small size, abundance, ease of capture, and adaptability to the laboratory, the species was convenient to work with logistically. (4) Finally, the live-bearing habit makes it possible to gather much more detailed information on reproduction of the molly than would be possible for an oviparious species.

Species Synopsis

The sailfin molly, Poecilia latipinna, is a member of the fish family Poeciliidae. The species is distributed in coastal environments almost continuously from South Carolina to the Yucatan Penisula of Mexico (Rosen and Bailey, 1963). It is a small fish, rarely exceeding three inches in total length. It inhabits a variety of fresh and brackish water environments, but is most characteristic of shallow, low-salinity ditches and marshes, where it often is abundant.

P. latipinna feeds primarily on detritus and periphytic algae, and does not often take animal food (Harrington and Harrington, 1961). The reproductive biology of the species is similar to other generalized members of the family (Amoroso, 1960; Rosen and Bailey, 1963; Thibault and Schultz, 1978). Females outnumber males in the adult populations, but the sex ratio among neonates is approximately one-to-one (Snelson and Wetherington, in press). Males have the anal fin highly modified and transformed into an intromittent organ, the gonopodium, to effect insemination of the female. Once inseminated, a female can store sperm for several months, producing several successive broods from one mating. The sperm are stored in specialized parts of the ovary, where they are nurtured (Jalabert and Billard, 1969).

As a clutch of eggs matures, they are fertilized and undergo development in their follicles. In some species the developing embryo is heavily dependent on the maternal system for sufficient nutrients to complete development. In other species, including P. latipinna, all or most of the energy required for complete embryological development is present in the egg yolk, and the embryo probably depends on the maternal system only for gas, waste, and ion exchange. Depending on the species and environmental conditions, embryological development may take from 20-50 days, with mean interbrood intervals for *P. latipinna* ranging from 26-36 days (Snelson, 1976). Young are born in an advanced stage of development and are given no parental care after parturition. Under favorable environmental conditions, a second clutch of eggs begins to mature immediately after parturition. At maturity they are fertilized and embryological development proceeds.

Brood size is positively correlated with female size, both within a species and between species. Small mosquitofish (*Gambusia affinis*) and sailfin mollies often have broods of less than five and occasionally may produce only one or two young. Large individuals of the two species may have broods of over 300 and 100 young, respectively (Krumholz, 1948 for *G. affinis*; personal observations for *P. latipinna*).

The only major studies on the field reproduction of *P. latipinna* are Hubbs (1964) and Sheinbaum (1979). Other aspects of the reproductive and population biology of this species have been treated by Baird (1968, 1974), Grier (1973), Simanek (1978), and Snelson and Wetherington (in press).

Methods, Materials and Study Area

Study Area Description

A detailed description of the aquatic habitats on Merritt Island was given by Snelson (1976), and a summary is presented here.

Merritt Island originally was bordered along most of its western and northwestern shore by extensive brackish-water *Spartina* marsh. On the interior of the Island there probably were few permanent bodies of fresh surface water. Although ephemeral runoff creeks and flooded catchment basins may have formed during rainy periods, they would have constituted relatively unimportant fish habitats.

Two events drastically altered the natural aquatic ecology on Merritt Island. The first was the construction in 1958 of earthen dikes (levees) around nearly the entire periphery of the Island, converting *Spartina* and mangrove marsh into a series of shallow "mosquito-control" impoundments (Provost, 1959, 1973). The second major alteration was the digging of borrow pits and ditches to provide fill for the construction of roads, and later, the installations for NASA's Kennedy Space Center in the early 1960's. These borrow areas and ditches created permanent surface reservoirs of water on the interior of Merritt Island. In addition, road and other construction altered the natural courses of some existing waterways.

The salinity of the ditches, ponds, and impoundments on Merritt Island varies considerably, ranging from nearly fresh to levels in excess of 30 ppt, depending on location, water source, and man's activities (see later). The nature and amount of aquatic vegetation varies according to salinity. In low salinity waters, *Chara*, *Najas*, *Ruppia*, *Ceratophyllum*, and *Utricularia* are characteristic submerged aquatic plants, and usually are abundant. *Sagittaria*, *Typha*, and *Ludwigia* are characteristic marginal emergents. At higher salinities, submerged vegetation is less abundant, usually confined to limited stands of Chara, Najas, and Ruppia. Typical emergent plants are various species of Spartina and salt tolerant varieties of Typha. In some areas, "salt grasses" such as Distichlis and Paspalum may form mats that encroach varying distances out into the water. Mangrove trees typically line the banks and dikes around brackish ditches and impoundments. In high salinity impoundments, submerged aquatic plants are limited or absent, particularly in areas where bottom sediments are flocculent and unconsolidated. In extreme cases, the only vegetation in an impoundment may be scattered clumps of Spartina bakeri, apparently remnants persisting from the marsh that existed prior to impoundment.

The most characteristic feature of the aquatic habitats on Merritt Island is their great variability in physico-chemical features. Because all the waters are shallow, temperatures fluctuate dramatically, both on a daily and annual cycle. Winter temperatures drop low enough to cause occasional hypothermal mortality (Snelson and Bradley, 1978), and often reach 35°C at the surface in summer. Furthermore, because there is a pronounced annual pattern of rainfall in central Florida, aquatic habitats on Merritt Island usually undergo a dramatic flooding-dessication cycle. Water levels normally are highest in fall and early winter, at the end of the rainy season. During the dry spring period, water levels drop quickly, usually reaching low stages between April and June. In early summer, the initiation of the rainy period and man's associated activities (see below) again cause water levels to rise. Many other physical, chemical, and biological features of the aquatic environments fluctuate dramatically, some (e.g., dissolved oxygen) in a pattern associated with temperature and water level, and others (e.g., turbidity) seemingly independently.

The most dramatic on-going influence of man's activities on Merritt Island's aquatic habitats is a vigorous mosquito-abatement program carried out by an agency of the county government (Provost, 1959, 1973). Among the several activities of the mosquito control agency, the most dramatic for fish ecology is "pumping". In order to inhibit the breeding of salt-marsh mosquitoes (Aedes taeniorhynchus, A. sollicitans) on exposed bottom sediments, it is desirable to maintain a rather high and constant water level in impoundments during the breeding season. Depending on rainfall, temperature, and other conditions, the impoundments and ditches reach most severe dessication between April and June. Some time during this period, usually coinciding with initiation of heavy summer rains, mosquito control personnel pump vast quantities of water from bays and channels directly connected with the Indian River lagoon system into the impoundments. This pumping is effected by means of both portable and permanently-installed diesel pumps. The water level in the impoundments increases abruptly, often reaching maximal levels within a few days. Lagoon water typically is of much higher salinity than the impoundments, so a dramatic increase in salinity results. Turbidity also increases substantially during pumping, and impoundment waters may remain "cloudy" for weeks after pumping ceases.

Pumping took place at VABI between May 16 and 25, 1977 and again between August 30 and September 3 of that year. VABI was not pumped during 1978. Pumping did not take place at either of the other two study area during the time of our study.

Overall, the aquatic habitats on Merritt Island are harsh environments for most fishes. Snelson (1976) listed only 35 fish species inhabiting the fresh and brackish waters on the interior of Merritt Island. The most characteristic groups were the families Poeciliidae and Cyprinodontidae, both notoriously hardy and tolerant groups.

Study Sites

The terms of the contract proposal state that two field populations of mollies would be sampled monthly for reproductive analysis. Because of prior experience (Snelson, 1976), we planned for the possibility that unforeseen circumstances could terminate study at a locality and, therefore, initiated this study using three, rather than two, study areas.

The following criteria were considered important in choosing study areas: (1) they should be within the security perimeter; (2) they should provide contrasting environments; (3) at least one of the sites should be relatively free from man-induced variations; (4) they should be readily accessible; (5) large populations of mollies should be present; and (6) the areas should be large enough and contain sufficient deep water to insure that the molly population would be able to survive through the annual low water period of later winter and spring. In addition, it was considered desirable, but not mandatory, to locate one study station near Launch Complex 39A or 39B, in case launch operations should prove to have an adverse effect on the study species.

It was determined early that one study site would be the "VAB Impoundment" used during previous studies (Snelson, 1976). It was felt that this station was acceptable by all selection criteria, and it had the additional advantage of providing continuity in the investigations. An extensive field survey was conducted during October, 1976, to locate additional study stations. Two study populations which met most or all criteria eventually were selected. The geographic locations of the three study areas are shown in Figure 1. . ey are described below.

Station 1 - VAB Impoundment (VABI). This is the same site studied for three years during our earlier grant phase and designated as the "VAB Impoundment" (Snelson, 1976). This long, finger-like impoundment, deignated on some maps as T-37, is located on the northeast side of the State Road 3, immediately northwest of the Banana Creek bridge (T22S, R37E, Sec. 7 and T22S, R36E, Sec. 12). Its center lies approximately 1.0 kilometer northwest of the Vehicle Assembly Building (VAB). The impoundment is bordered on its southeastern tip by the Banana Creek dike, along its southwestern border by S.R. 3, and along its northeastern side by an elevated railroad bed. The northwestern end is not diked. Estimated surface area is 30 acres. This impoundment appears to communicate freely with the adjacent impoundment northeast of the railroad dike, through an open water-level control culvert.

The water depth is shallow, averaging less than one-half meter over most of the impoundment. Deep water is confined to dredged areas. One such hole, circular in outline, is in the center of the impoundment. A small dredged ditch and several small holes are located along the southwest side, adjacent to S.R. 3. The major dredged area is the dike-side canal along the northeast edge of the impoundment adjacent to the elevated railroad bed. Under normal conditions, these deeper areas average 2-2.5 m.

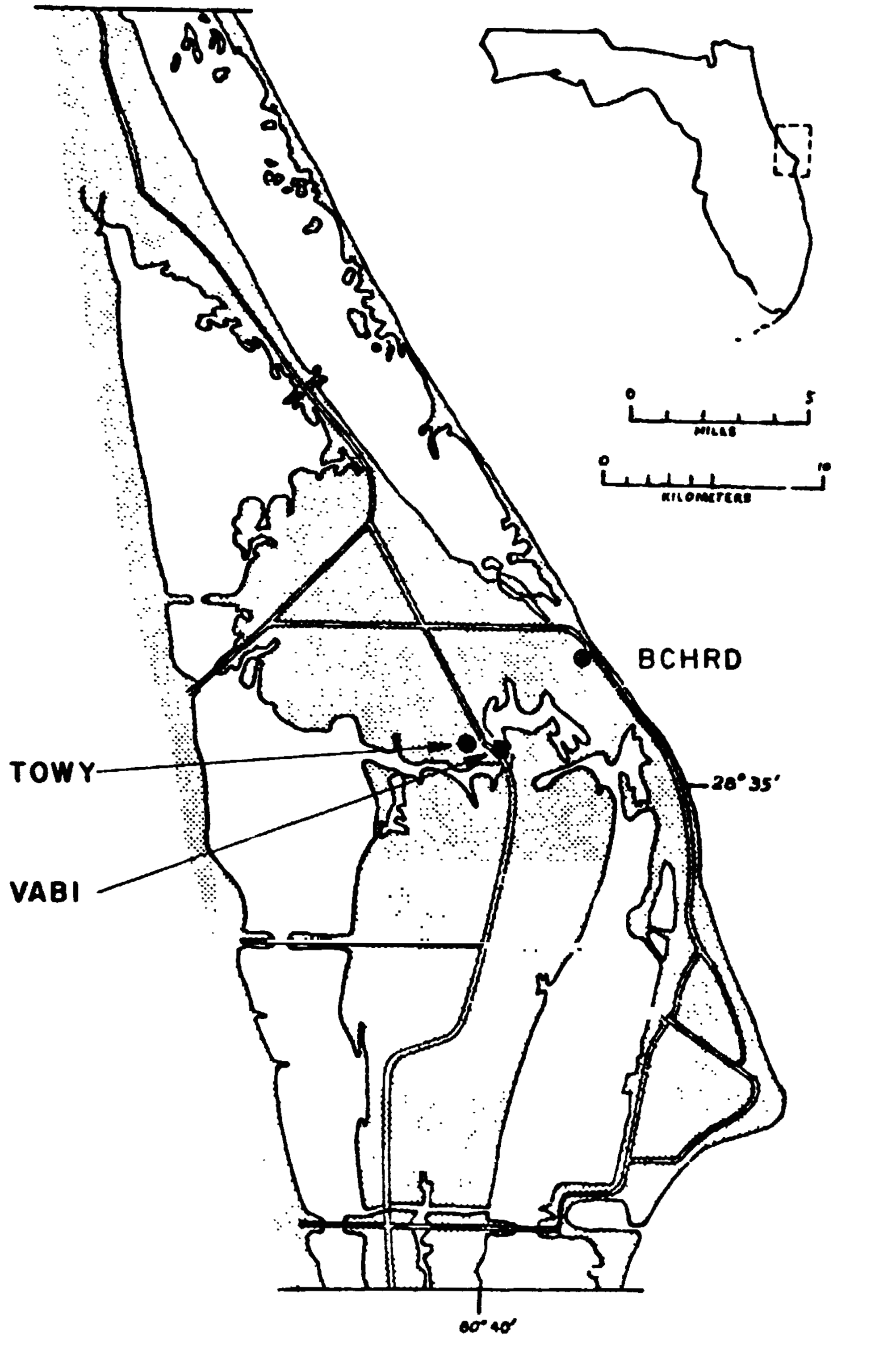

Figure 1. Map of Merritt Island and vicinity, Brevard County, Florida, showing the locations of three study sites used in the sailfin molly reproduction study.

Shallow areas, exposed during parts of the year, are vegetated heavily with a variety of aquatic or semi-aquatic plants such as Spartina (cord grass), Distichlis, and Paspalum (salt grasses). Deeper areas, particularly where the bottom is relatively firm, support mats of Chara (musk grass) that become thick at certain times of year. Dredge holes with excessively flocculent bottom sediments usually are not invaded by plants. Except for a few mangrove trees growing near the southeast end, the perimeter of the impoundment is relatively free from overhanging vegetation.

During periods of severe low water, Brevard Mosquito Control District personnel position a portable, diesel-powered pump on the dike between Banana Creek and the impoundment, and pump turbid, high-salinity water from the Creek into the impoundment. Salinity and turbidity of water in the impoundment increase drastically as water levels rise.

Station 2 - Tow-way Ditch (TOWY). To accomodate the activities of the upcoming space shuttle program, a runway-landing strip was constructed west of and parallel to S.R. 3, north of Banana Creek. A tow-way, extending from the runway to the VAB, provides a route by which the reusable orbiter transported to the VAB complex for refurbishing. During construction of the tow-way, several mosquito control impoundments were disrupted. Impoundment T-18 was most drastically affected. It was split approximately in half, and the majority of its eastern end was drained or eliminated.

Our TOWY study station is in the disrupted eastern end of old impoundment T-18 (T22S, R36E, Sec. 12). It is an approximately triangular-shaped area, bordered by S.R. 3 on the northeast, by the shuttle tow-way on the south, and by a dike on the northwest. Its center is approximately 2 km west by northwest of the VAB. The surface area is 7-10 acres during normal water stages. Shallow marsh areas less than one-half meter deep are relatively limited, confined primarily to one spot. Deep water is relatively extensive in the long canal adjacent to the tow-way and in a small dredged hole in the northeast corner of the area. The shallow zones never dried completely during this study, and always maintained open communication with the ditch, even during extreme low water.

Shallow and exposed areas are densely vegetated with a variety of aquatic and semiaquatic plants such as Spartina (cord grass), Distichlis, and Paspalum (salt grasses). The portion which usually is submerged, particularly where the muck bottom is firm, supports a dense growth of Chara (musk grass) and Najas. The dredged hole in the northeast corner has a deep, organic bottom sediment and supports no vegetation. During the second year of study, plants characteristic of standing fresh water became prevalent along the canal, particularly duckweed (Lemna) and cattail (Typha). There are a few scattered patches of mangrove located along the south side, and the dike on the northwest side supports a moderate stand of Spartina. Otherwise, the perimeter of the area is relatively free of overhanging vegetation.

Station 3 - Beach Road Impoundment (BCHRD). This study station is located immediately west of Beach Road, and lies less than 0.4 km from the ocean (T21S, R37E, Sec. 28). Its center is approximately 4 km northwest of the intersection of Beach Road and Saturn Parkway, and 0.8 km north of launch complex 39B. It is bordered by Beach Road on the east and by a series of narrow dikes over the remainder of its periphery.

The sampling area consists of two shallow borrow ponds which represent only a small section of an extensive network of interconnected ponds that drain the region adjacent to LC 39B. The finger-like basins comprising the station lie parallel, about 15 meters apart, in a southeast-northwest orientation. The eastern basin is the smaller, with an estimated surface area of five acres. The larger western basin has an estimated surface area of ten acres. The two ponds are separated physically along most of their length by a low-elevation bridge of land. They are interconnected at their northern ends by a narrow ditch. A canal approximately 5 meters wide and 30 meters long extends eastward from the southeastern corner of the larger pond, toward the road.

Water depth averages less than one-half meter. Deep water is confined to dredged areas. These consist of the aforementioned ditches and dike-side canals that skirt the entire station, except for a short segment of the northeast corner of the smaller basin. The deeper areas have an average depth of 1.5 to 2.0 meters.

The salinity is higher at this station than at any other study area. Considering the proximity of the ocean, superficial salt deposits and/or sea water intrusion are likely.

The station is nearly free of rooted aquatic vegetation. Aquatic plants, including those tolerant of moderate salinities, have not established themselves well over the soft bottom. The substantial turbidity also may act as a deterrent to submerged plant growth. In marginal zones and in scattered open water areas where the bottom is firm, characteristic plants are Chara and Ruppia (widgeon grass). The station's perimeter is bordered by an extensive stand of mangrove, but little of it overhangs or grows in the water. The entire area apparently was rechannelized and rediked a short time before initiation of the study, and gives the impression of recent disturbance.

Table 1 summarizes and compares major quantitative and qualitative physical, chemical, and biological parameters of the three study sites.

Methods

Fish Sampling

Each study area was surveyed carefully and 12 permanent sampling sites were selected. These sites were marked with pieces of PVC pipe approximately 20 cm in length and designated by number. An attempt was made to include all microhabitat types. Since approximately 300 mollies per station per month were required to yield an adequate size subsample of adult females, it usually was not necessary to take fish samples from all twelve sites. Therefore, one site was selected at random and sampled. If the appropriate number of fish was not caught, a second site was selected at random and sampled. This procedure was continued until approximately 300 mollies were collected. If this quantity was not obtained from all twelve possible sites, repetitive sampling became necessary. This was accomplished by repeating the above procedure.

Sampling began in October, 1976 and continued through December, 1978. Fish samples usually were taken during the first week of every month.

Table 1.
Summary and comparison of some environmental features of three sailfin molly study sites on Merritt Island, Florida.

	VABI	TOWY	BCHRD
Salinity (ppt)			
range	7.0 - 38.0	0.0 - 12.0	16.0 - 40.0
mean	17.6	3.9	26.1
Temperature (°C)			
average daily max.	23.5	24.2	24.6
average daily min.	20.1	21.3	19.6
average daily median	21.8	22.7	22.1
Water Level Fluctuation (cm)			
range	72	62	56
Turbidity (NTU)			
range	0.73 - 23.00	0.80 - 12.00	1.30 - 48.00
mean	5.00	2.70	15.60
Dissolved Oxygen (ppm)			
range	1.5 - 9.2	0.5 - 10.3	0.3 - 10.0
mean	4.9	5.1	4.1
pH			
range	7.3 - 9.4	7.7 - 9.4	7.4 - 9.5
mean	8.4	8.2	8.4
Ortho-phosphate (mg/1)			
range	0.000 - 0.261	0.000 - 0.442	0.003 - 0.385
mean	0.066	0.112	0.115
Nitrate - nitrogen (mg/1)			
range	0.000 - 0.277	0.000 - 0.292	0.000 - 0.310
mean	0.089	0.103	0.077

Table 1.

Summary and comparison of some environmental features of three sailfin molly study sites on Merritt Island, Florida. (Continued).

	VABI	TOWY	BCHRD
Phytoplankton Chlorophyll (mg/m^3)			
range	0.000 - 21.628	0.411 - 10.908	0.788 - 13.831
mean	3.357	2.886	4.976
Periphyton Chlorophyll ($mg/cm^2/day$)			
range	0.0002 - 0.0082	0.0010 - 0.0143	0.0006 - 0.0101
mean	0.0017	0.0044	0.0026
Submerged Vegetation	Abundant	Abundant	Scarce to absent
Rainfall	About same as TOWY, and probably close to figures in Table 3.	About same as VABI, and probably close to figures in Table 3.	Less than both VABI and TOWY.
Impact of Dessication	Severe; deep-water refugia relatively limited.	Minor; deep-water refugia relatively extensive.	Very severe; deep-water refugia very limited.
Production Base	Probably periphytic algae, macro-algae, and rooted vascular plants.	Like VABI.	Probably plytoplankton, detritus
Impacted by Pumping	Yes	No	No

The standard collecting gear employed was a "common sense" minnow seine 3.7 m long, 1.2 m deep, with a 4.5 mm bar mesh. Seining was quantified by timing. One seiner or an assistant operated a stop watch. The watch was started when a seine haul began and stopped when the forward progress of the haul ceased. After each seine haul every specimen was preserved in a solution of 10-15 percent formalin. Each site collection was assigned to a separate container, and the time duration was recorded.

Environmental Measurements

The following parameters of the aquatic environment at each study station were measured in the field, concurrently with fish sampling. In each case, we tried to utilize a technique combining simplicity, reliability, and appropriate sensitivity, as suggested by Strickland and Parsons (1972) and EPA (1974).

Water Temperature. Water temperature was determined at each site from which a fish sample was taken. It was measured approximately half-way between the water surface and bottom, using a shaded stem thermometer calibrated in degrees centigrade.

Monthly Water Temperature. Surface water tempeature was continously recorded at each study site by a submersible thermograph (Ryan Industries Model G). These instruments were suspended from and shaded by wood and styrofoam floats. A continous temperature record was scribed on a 15 day chart by a stylus responding to temperature changes. The clock motor was battery driven. The chart was calibrated in degrees Fahrenheit (°F) which was converted to degrees Centigrade (°C). From the charts, we determined the temperature characteristics of the 30-day period preceding the fish sample day.

Salinity. Surface salinity was determined in the field, using either an American Optical Company optical refractometer or a Yellow Springs Instrument Model 33 battery-powered, salinity-conductivity-temperature meter.

Water Level Change. A water level monitoring gauge consisted of a piece of white PVC pipe approximately three meters in length. The pipe was marked with shallow saw cuts at two cm intevals along its entire length, and was permanently lodged in the substrate at one of the deepest spots in each study basin. The distance between the uppermost mark at the top of the pipe and the water surface was recorded monthly, to the nearest cm.

The following chemical water parameters were determined monthly from water samples taken either concurrently with, the day before, on the day following taking of fish samples. Water samples were taken from the deepest area at each station, using a Kemmerer water sampler. The sampler was operated from a canoe or small boat to prevent disturbance of the bottom sediment. Usually, one 2.3 liter Nalgene bottle and two 300 ml BOD bottles of water were collected from each station. Water samples were kept on ice and in darkness and returned immediately to the laboratory for analysis.

Turbidity. Turbidity was measured with a formazin-standardized Hach Model 2100A turbidimeter. Results were expressed in NTU's (Nephelometric Turbidity Units). NTU's are directly comparable to previously reported FTU's (Formazin Turbidity Units) and JTU's (Jackson Turbidity Units).

Dissolved Oxygen. Dissolved oxygen was determined from sample water in BOD bottles, using a Yellow Springs Instrument Model 51A oxygen meter and stirring probe. The instrument was calibrated before each use by a Winkler titration determination of dissolved oxygen in one of a matched pair of samples. Results were expressed in parts per million (ppm).

pH. pH was determined using an Orion Model 399A pH meter, calibrated using a stock buffer solution of pH 7.00.

Ortho-phosphate. Ortho-phosphate concentration in a water sample was determined by using the phospho-molybdate standard method (Strickland and Parsons, 1972). Absorbance of the test solution was read with a spectrophotometer (Beckman Model 26 or American Optical Spectronic Model 88) at 800 nanometers, and concentration was calculated in mg/liter from predetermined standard curves.

Nitrate-Nitrogen. Nitrate level was evaluated in water samples by using the brucine sulfate method (EPA, 1974). Absorbance of the test solution at 410 nanometers was determined spectrophotometrically, and the concentration in mg/liter was calculated using a previously determined standard curve.

The standing crop of phytoplankton and periphyton was determined by chlorophyll analysis, and these measures were used as indicators of habitat productivity.

Phytoplankton Chlorophyll. A liter sample of water was filtered through a Gelman glass filter, and the chlorophyll pigments of the trapped phytoplankton were extracted with acetone. The extracts were held in dark refrigeration for 24 hours and then read in a spectrophotometer at 665, and 630 nanometers. Concentrations of chlorphyll a, b, and c were determined by using the Richards and Thompson equations (Strickland and Parsons, 1972). Results were expressed in mg/m^3.

Periphyton Chlorophyll. The standing crop of periphyton grown on a standard substrate was detemined at each locality. Floats constructed of wood and styrofoam were anchored in place in deep water at each station. From each float, four pieces of nominal 1/4" diameter braided nylon rope, approximately 45 cm long, were suspended down into the water. The ropes provided an attachment surface for the growth of algae. the ropes were left in place for the approximately 30-day period preceding the date of fish sampling. At the time of sampling, the ropes were removed, their precise lengths were measured, and they were transported to the laboratory in plastic bottles.

Quantification of the attached plant matter was made by the extraction and measurement of chlorophyll pigments as described above under phytoplankton. Results were expressed in $mg/cm^2/day$.

Laboratory Methods.

Specimen Examination and Handling. All fishes collected in the field were preserved in 10-15 percent formalin and returned to the laboratory for examination. The samples were sorted and identified to species, and all individuals were counted and recorded.

From the mollies sampled at each station, a subsample of 150 adult females (≥18 mm standard length) was removed as follows. The sample was placed in a large bucket containing alcohol. The fluid was swirled and mixed by hand agitation until the specimens appeared to be randomly mixed in the fluid medium. A small tea strainer then was dipped into the bucket, catching 20 to 30 specimens each dip. This process was continued, with constant agitation, until the number desired in the subsample had been removed. These fish were used for reproductive analysis. The lower size limit of 18 mm was chosen because previous work (Snelson, 1976) had shown 18 mm to be the minimum size at which females become sexually mature.

Sex Determination. As in all poeciliids, mature male *P. latipinna* have the first several rays of the anal fin elaborately transformed into an intromittent organ, the gonopodium (Cummings, 1943). We classified males as mature when the gonopodium was judged to be fully differentiated on the basis of three features: (1) fleshy palp (also called hood or prepuce) along anterior (ventral) margin of ray three enlarged and pendulous; (2) fin rays clear and translucent as opposed to cloudy and opaque; and (3) terminal hook of ray three and retrorse claw of ray five well formed and clearly projecting beyond surrounding cutis (terminology of Rosen and Gordon, 1953). In addition, large mature males usually could be readily identified externally by other secondary sexual features, especially body shape, fin size and shape, and color pattern (see Hoese and Moore, 1977, for color photograph). Immature males often could be identified externally on the basis of incipient elongation and modification of the anal fin rays.

Fish without gonopodial development were sexed by direct examination of the gonad. Gravid or pregnant females were identified by the presence of eggs or embryos in the enlarged ovary, even though they usually could be recognized without dissection by their bulging abdomens. The testis of immature males is unpaired and elongated, appearing as a white, ribbon-like organ attached along the posterior-dorsal midline of the peritoneal cavity.

The immature ovary and testis were easily distinguished in the smallest specimens examined, about 15 mm standard length (SL). In a fish this size the testis is thin and almost transparent. It can be destroyed easily or overlooked in carelessly dissected specimens. The peritoneum covering the testis is devoid of melanophores, and the organ appears to have a homogeneous texture. The ovary, in contrast, is a relatively large, conspicuous organ, even in very small fish. The shape usually is distinctive, cylindrical to bluntly oval and tapering abruptly posteriorly to the narrow oviduct. Owing to the presence of primary oocytes, the ovary appears granular in texture under high magnification; and the investing peritoneum contains numerous melanophores.

Reproductive Condition. Females were assigned to one of four reproductive conditions: (1) with undeveloped ovaries, (2) with developing ova, (3) with mature ova, or (4) pregnant. Conditions 1 and 2 were readily determined from the *in situ* ovary. The undeveloped ovary contained only whitish, unenlarged ova. Developing ova, on the other hand, were noticeably enlarged and at least slightly golden or yellowish, indicating that yolk formation had begun. Usually there were several eggs in the ovary in a similar developmental stage. However, the presence of a single developing ovum was sufficient to classify the female in this class. When *in situ* examination revealed an ovary containing embryos or greatly enlarged eggs, the organ was excised. The ovary was teased apart on the microscope stage and each individual egg was removed from its follicle and examined. If embryos were present on the eggs, the female was classified as pregnant. Usually, several embryos in a similar stage of development were present, but the presence of a single embryo was sufficient to classify the female as pregnant. If the eggs had reached the maximum size but no embryos were visible, they were considered mature.

In using this classification, one occasionally must make the troublesome decision as to whether ova are in late stages of development (stage 2 above) or whether they are mature (stage 3). This decision was based on size of ova. Although eggs were not measured the experienced worker developed a good "feel" for the maximum size attained by a mature egg. In addition, all eggs in a mature clutch are similar in size. Eggs late in development but not fully mature are smaller than mature eggs, and there usually is a substantial amount of size variability between eggs in the same clutch. It should be pointed out that mature eggs, as classified here, could be either unfertilized or fertilized. There is a period, probably lasting about 48 hours after fertilization, during which embryonic development proceeds but would not be recognizable under the dissecting microscope (Hopper, 1943; Tavolga, 1949).

Counting and Staging of Embryos. Each mature egg was counted and the total clutch was recorded. When embryos were present, each was counted and the average stage of development for the clutch was determined. Embryos were assigned to stages 1, 2, or 3, corresponding to early, intermediate, or advanced phases of development. There is no published study on the detailed embryological development of *P. latipinna*, so our stages were determined arbitrarily after surveying the entire continuum of embryonic development. Stage 1 begins when an embryo first becomes clearly recognizable. Stage 1 terminates at that point in development when a few melanophores are present on the top of the head and on the anterior part of the back. The caudal fin rays are not clearly developed, and there is no pigment on the tail. Stage 2 begins when pigment is well developed on the head, down the midline of the back (usually in two parallel rows of melanophores), and down the sides of the caudal peduncle. The caudal rays are clearly formed, and a few black flecks of pigment are present on the fin. Stage 2 ends when the embryo has pigment well-developed on all areas of the body. The pigment, however, is present as uniformly scattered melanophores showing no pattern, especially on the head dorsum and posteriorly on the sides of the body. Stage 3 begins when pigment begins to organize into a pattern characteristic of free-living young. This is first noticeable on the head dorsum and on the sides of the body as melanophores tend to organize along the margins of scales.

We have assumed that the development of the sailfin molly is similar to that of *Xiphophorus maculatus* (Hooper, 1943; Tavolga and Rugh, 1947; Tavolga, 1949). On this basis, we estimate that stage 1 lasts about 5.2 days, stage 2 about 5.7 days, and stage 3 about 5.5 days.

Since the molly does not normally superfetate (Turner, 1940a; Scrimshaw, 1944a), all embryos in a brood are in approximately the same stage of development. However, the exact timing of fertilization may vary by as much as 48 hours among eggs in a single brood (Hooper, 1943; Tavolga, 1949). Consequently, all embryos in a brood are never of identical age, and there are occasions when part of a brood will be in late phases of one stage (e.g. late stage 1) while other brood-mates are in early phases of the succeeding stage (e.g. early stage 2). In such cases, all embryos were recorded as being in that stage represented with greatest frequency in the clutch.

Counting Unfertilized Eggs and Abnormal Embryos. If a single stage 1 embryo was observed among a clutch of eggs, all eggs present were enumerated as stage 1 embryos, whether or not an embryo was visible on every egg. The assumption was that all eggs in a clutch were fertilized if one embryo was clearly evident. If fertilization time varies by as much as 48 hours within a clutch, the oldest zygotes might be visible embryos whereas youngest zygotes still could be in indiscernible stages of development (Hopper, 1943). In most cases, even in very early stage 1, several embryos can be discerned within a clutch.

After a brood passes into stage 2 development or beyond, it occasionally is apparent that a few eggs within a clutch never were fertilized or, if fertilized, ceased development before a recognizable embryo was produced. Such eggs have a milky yellow color, often bear discolored spots, and usually are atypically hard and brittle. They were recorded as "unfertilized eggs" among a developing brood in stage 2 or 3.

Hubbs (1964) defined a condition of "partial pregnancy" among the Texas populations he studied. Partially pregnant females were those that carried broods in which a significant (unspecified) number of the eggs were unfertilized. Hubbs attributed partial pregnancy to relatively low male frequencies resulting in infrequent inseminations and females consequently depleting stored sperm. We have observed no such conditions, and only rarely have encountered broods with more than one or two unfertilized eggs. We do not, therefore, recognize partial pregnancy.

In addition, abnormal embryos usually are easily distinguished from normal broodmates by the time stage 2 development is reached. Abnormal embryos exhibit any one of several anomalies, but usually are immediately evident to the practiced observer. They usually are smaller than their broodmates, and are in earlier stages of development. The embryo often is discolored; the head or eyes often are misshapen or atypically formed; pigment is poorly developed or appears in atypical locations; the caudal half of the body may be unusually shortened, and the caudal fin may not form; the spine may be abnormally flexed; often the embryo appears to be buried within its yolk rather than lying around its periphery. Abnormal embryos were counted and recorded when they occurred in stage 2 or 3 broods.

Measuring. All specimens were measured to the nearest 0.1 mm standard length (SL) with vernier dial calipers according to the procedures of Hubbs and Lagler (1958). Total length (TL) occasionally was recorded. It was measured from the tip of the lower jaw (mouth closed) to the tip of the longest caudal fin rays on a steel millimeter rule mounted on a plexiglass holder in the fashion of a standard fish measuring board. Total length was read to the nearest 0.5 mm.

Data Handling. Data were stored, retrieved, and analyzed by computer. The data coding formats and procedures are detailed elsewhere (Snelson, 1977a). Data analysis used standard statistical procedures, combining "canned" software of SAS and SPSS and programs written specifically for the molly study.

The "replacement index", calculated from each monthly sample from each locality was derived as follows:

$$RI = \frac{1/2 \text{ total normal embryos}}{\text{total adult females}}$$

One-half of the embryos was used because it is apparent that the sex ratio at birth in these populations is very near one-to-one (Snelson and Wetherington, in press). Thus, half of the embryos in each monthly sample are assumed to be females. For VABI and TOWY, any female greater than 21.9 mm SL was considered an adult; at BCHRD, the size for adulthood was greater than 23.9 mm SL.

Comparisons among regression lines for brood size on female length were based on Bartlett's test for homogeneity for variances, followed by covariance analysis and, when required, the Student-Newman-Keuls test for multiple comparisons among slopes and intercepts (Zar, 1974). When using untransformed data, Bartlett's test always revealed heterogeneity among the variances in any given set of lines. In addition, plots of residuals revealed that the variance around the lines generally increased as the independent variable (female length) increased. In order to remove these objectionable features, various transformations were applied to the data. In the final comparison, no transformation consistently resulted in any greater improvement than simple $\log_{10}$ transformation of the dependent variable (brood size). The log transformation virtually eliminated the tendency of the variance to increase with increasing female size. In all cases, this transformation also significantly reduced heteroscedasticity among the lines, but in no case was complete homoscedasticity achieved as measured by the Bartlett's F-test ($p<0.05$). One peculiar feature of the log transformaion is that the procedure tends to make slopes more uniform and intercepts more dissimilar, virtually opposite the pattern in the untransformed data. In this report, the linear graph lines shown are computed from the untransformed data, but all statistical interpretations and tests were based on the transformed data. The significance level used was $p<0.05$.

Results

Molly Reproduction

The basic data from the molly reproduction study is summarized in Appendix Tables 1-86.

Length of Reproductive Season.

The first month of study, October 1976, was the last month of reproduction for 1976. In both 1977 and 1978, reproduction had begun by early April. No fish were pregnant in early March samples. However, the high frequency of pregnancy in some of the April samples (Figure 2), for example 61 percent at BCHRD in April 1978, suggests that active reproduction began in some cases in middle to late March. In all cases, pregnant females in the April samples carried broods in the earliest phases of development, stage 1 or, rarely, stage 2. This is additional confirmation that actual reproduction had begun only a few days prior to the sampling date in April. There is only one exceptional instance when a central Florida population is known to have initiated reproduction prior to April. Snelson (1976) reported that his RRCD population, from a ditch on the western side of Merritt Island near the junction of State Roads 402 and 406, began reproduction in February, 1974.

The end of the reproductive season was somewhat more variable; but, in general, successful reproduction terminated in middle to late October. In 1976, there were no pregnant fish in the early November samples at VABI or TOWY. At BCHRD, 4 of 92 adult females (4%) were pregnant. In 1977, early November samples at VABI and TOWY contained no pregnant fish. In early November 1977 at BCHRD, 7 of 156 adult females were pregnant. In 1978, the November sample at TOWY contained no pregnant females. At VABI and BCHRD, a very few females in the early November, 1978 sample were pregnant (3 percent and 2 percent, respectively). All carried broods in late stages of development. Snelson (1976, 1977a) also noted the cessation of successful reproduction in October.

The few females that protract reproduction into November may be relatively unsuccessful at producing viable progeny (Table 2). In several cases all the gametes carried by a female were either abnormal embryos or unfertilized eggs.

Frequency of Pregnancy.

The percent of adult females pregnant in each monthly sample is shown graphically in Figure 2, and the basic data are given in Appendix Table 87. Since only one month of reproduction was included in the 1976 study, only the data for 1977 and 1978 are shown.

In 1977, the frequency of pregnancy curves showed similar trends for all three sites, with spring or early summer peaks, a middle summer depression, and a late summer or fall peak. The first peak occurred in May (TOWY, BCHRD) or June (VABI). Actually, the peak in May at BCHRD was only 18 percent with 22 of 122 adult females pregnant. Pregnancy percentages at BCHRD were less than 20 percent until September in 1977. The

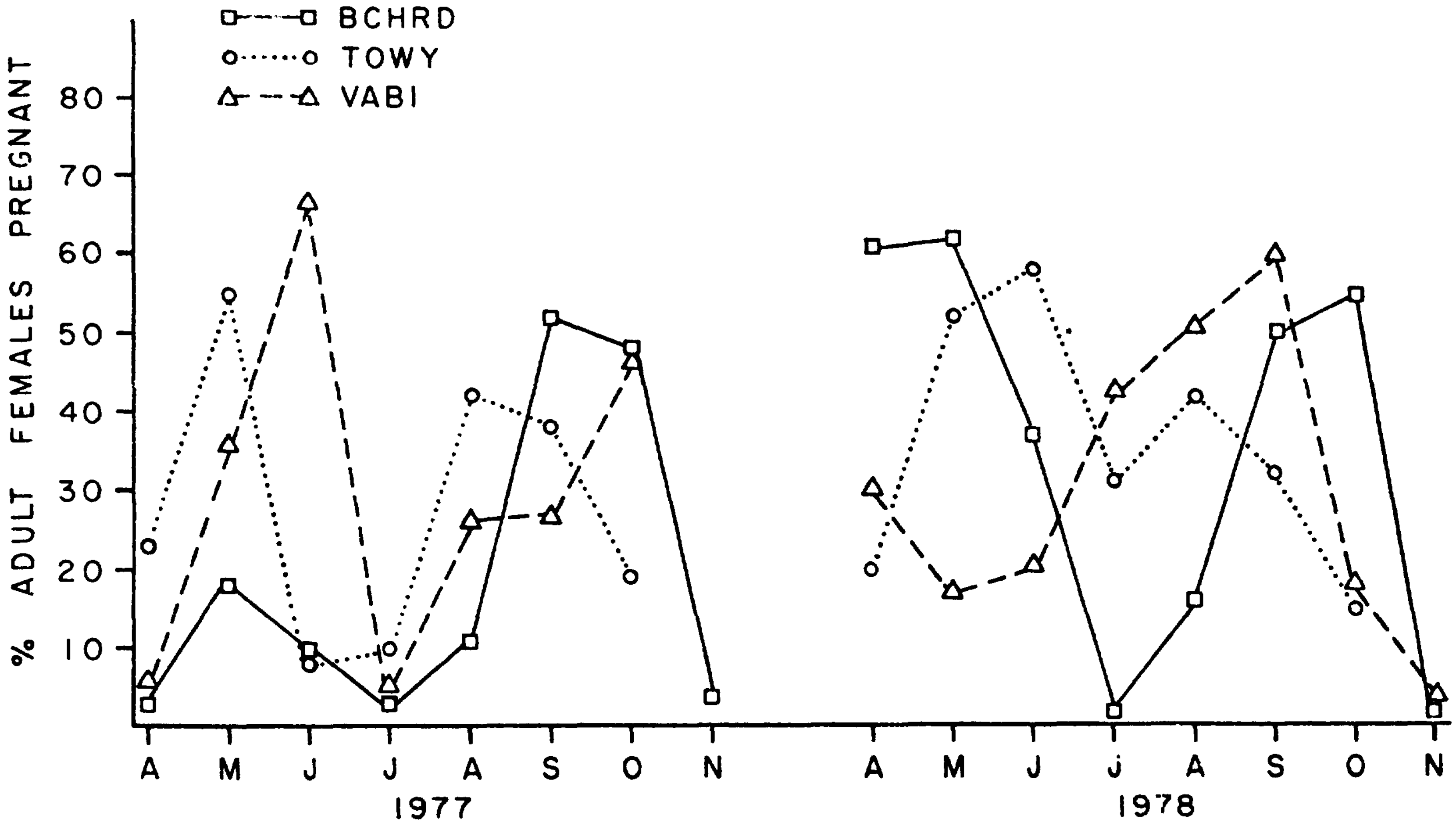

Figure 2. The percentage of adult females pregnant in monthly sam . of the sailfin molly (Poecilia latipinna) from three study sites. Females were considered adult if they exceeded 21.9 mm SL at VABI and TOWY, and 23.9 mm SL at BCHRD.

mid-summer slump in pregnancy occurred in July at VABI and BCHRD, and in both June and July at TOWY. At all three sites, reproduction recovered dramatically after the mid-summer period, and peaked again in August and September (TOWY), September and October (BCHRD) or October alone (VABI).

In 1978, the general trends of the 1977 curves were repeated at TOWY and BCHRD. At TOWY, peak pregnancy percentages occured in June and August, with only a modest depression in July when 31 percent of the adult females were pregnant. At BCHRD, there was a dramatic surge of reproduction in early spring (April and May), a near-cessation of reproduction in July (2 percent), and a dramatic recovery in September and October.

The pattern of pregnancy percentages at VABI in 1978 was atypical. Reproduction dropped from 30 percent in April to 17 percent in May, the low for the season, and then gradually climbed to reach a peak in September.

Size of Reproducing Females

Mollies at BCHRD reached a larger size than at TOWY and VABI, and the mean size of pregnant females was much larger (Appendix Tables 88-95). The mollies at TOWY and VABI were similar in size; and during 1977, the distributions of mean sizes for reproducing females nearly were identical. For 1978, reproducing females at TOWY were somewhat larger than in 1977, and were considerably larger than those at VABI (Figures 3-5).

The mean size of pregnant females relates both to the maximum size attained and to the size at which reproduction begins. At VABI and TOWY, reproduction normally began at about 22 mm SL (Appendix Tables 94-95). For both sites over the two years of study, only 6 of 1,213 pregnant females were smaller than 22 mm SL. At BCHRD, females generally were slightly larger, 24 mm SL or greater, when they began to reproduce. Of the 558 pregnant females examined from BCHRD, only 3 were smaller than 24 mm SL.

In 1976 and 1977, pregnant females at VABI and TOWY rarely exceeded 40 mm SL, whereas females at BCHRD were as large as 50 mm SL. In 1978, the distribution at VABI and BCHRD essentially was unchanged, but at TOWY there were a small number of pregnant females between 40 and 48 mm SL.

During the 1977 season, the trends in mean size of pregnant females were similar at all three sites. The first females to begin reproduction in April were the largest of the overwintering females. The mean dropped in May as small overwintering females became pregnant. As the overwintering females grew, the mean size of pregnant females increased, peaking in June or July. The mean size declined abruptly again in the late summer or fall (August or September). This apparently was due to a combination of dying-off of large females from the population and recruitment of small females, born in April and May, into the breeding population.

For 1978, the trends for mean size of pregnant females were unlike the 1977 trends. At BCHRD and TOWY, the 1978 trends are nearly

Table 2
The reproductive record of pregnant female mollies from November samples.

Locality-Date	♀ SL	Brood Stage	Normal Embryos	Abnormal Embryos	Unfertilized Eggs
VABI					
9 Nov, 1978	27.8	3	1	2	1
	32.2	3	5	0	1
	32.5	3	3	3	0
	33.9	2	12	0	0
BCHRD					
1 Nov, 1976	25.6	2	3	0	0
	33.7	2	3	0	0
	36.3	2	11	0	0
	43.9	2	31	0	0
5 Nov, 1977	19.0	2	4	1	0
	33.1	-	0	5	0
	33.8	-	0	2	5
	34.8	-	0	3	1
	35.6	2	8	7	0
	37.2	2	6	0	1
	40.7	-	0	11	3
	42.1	3	10	1	0
9 Nov, 1978	36.7	3	7	0	1
	42.3	3	5	4	0
	45.0	2	20	0	0
	45.8	3	25	1	0

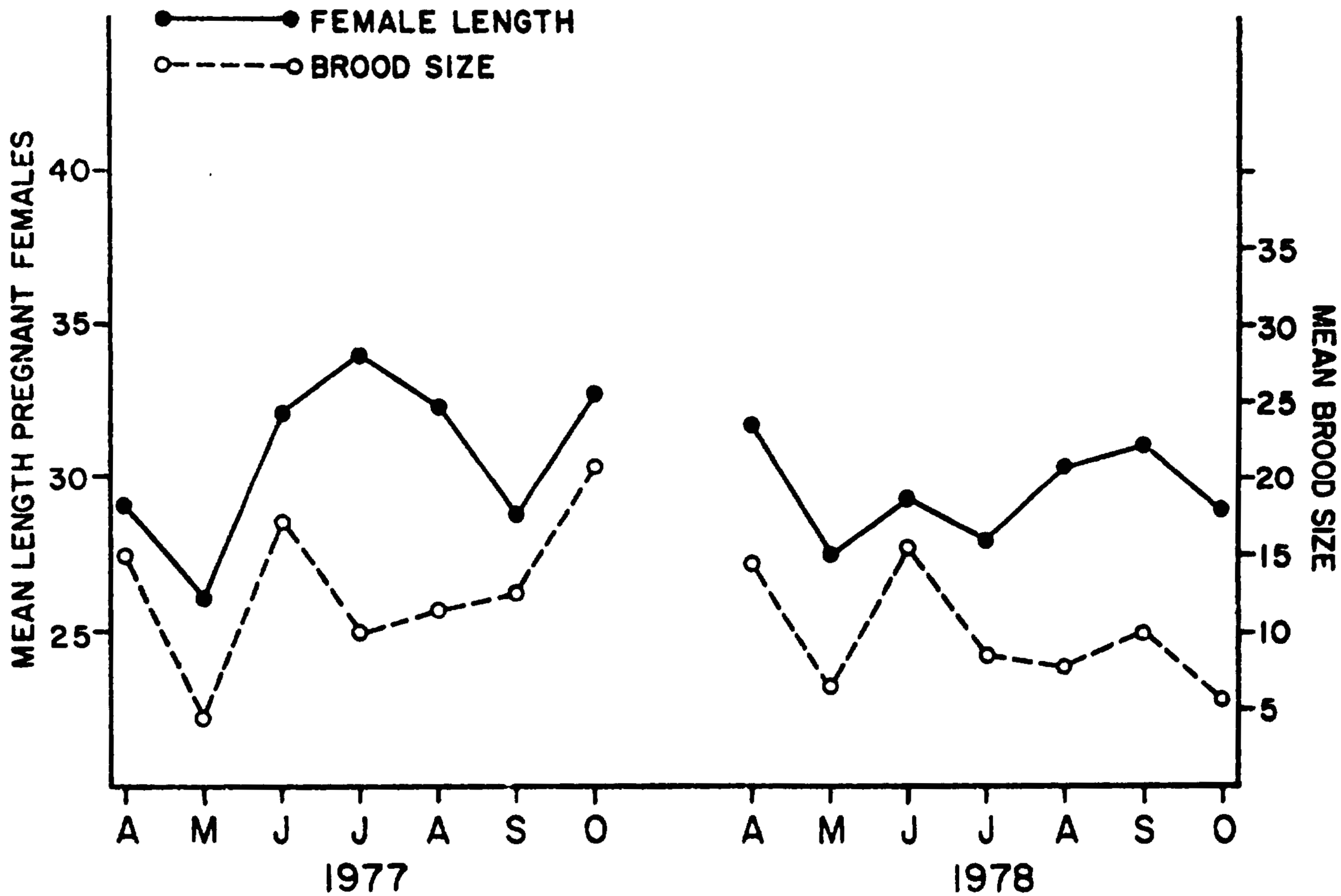

Figure 3. The mean length (mm SL) of pregnant females and the mean brood size for monthly samples of the sailfin molly (Poecilia latipinna) from the VABI study site.

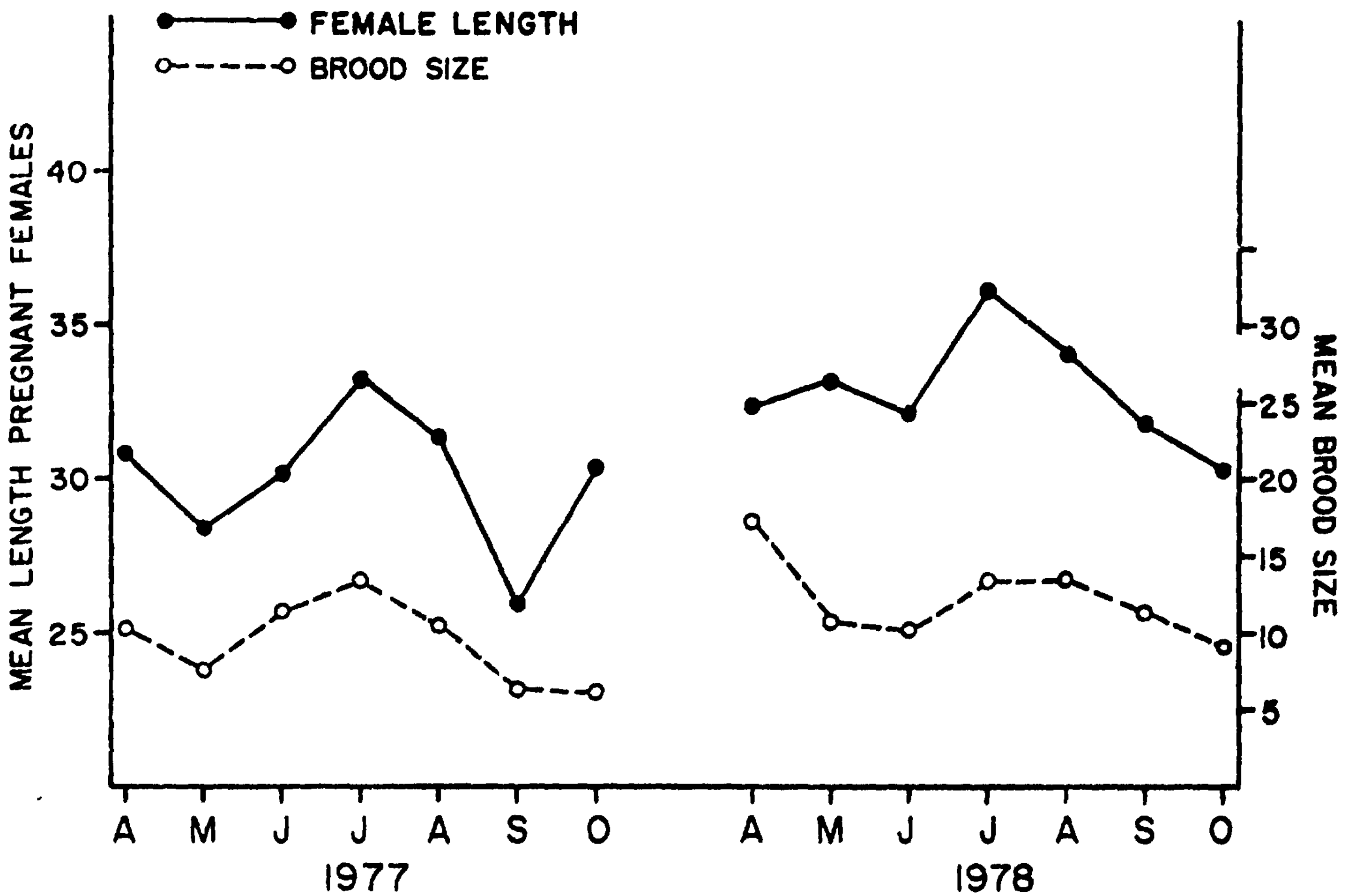

Figure 4. The mean length (mm SL) of pregnant females and the mean brood size for monthly samples of the sailfin molly (Poecilia latipinna) from the TOWY study site.

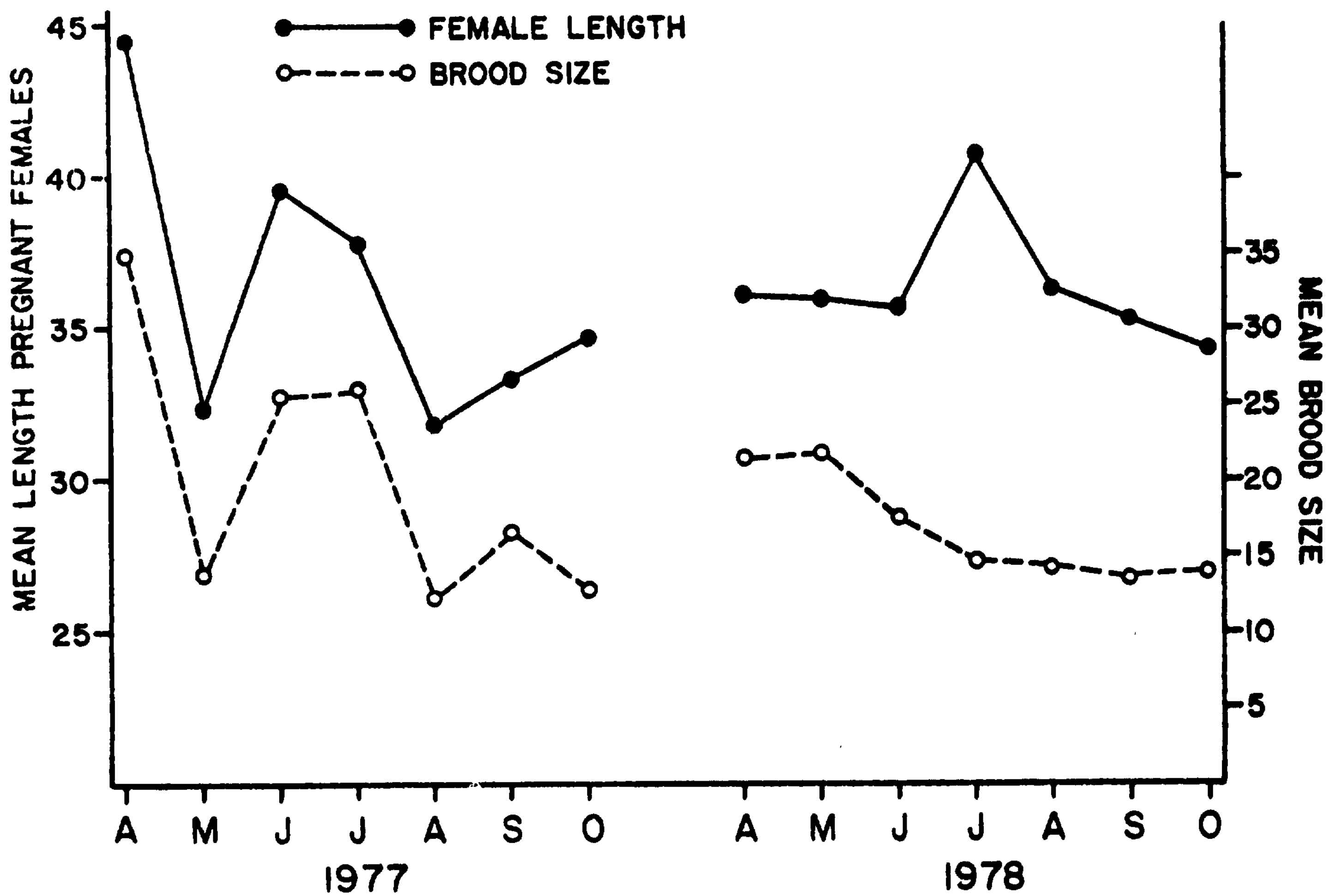

Figure 5. The mean length (mm SL) of pregnant females and the mean brood size for monthly samples of the sailfin molly (Poecilia latipinna) from the BCHRD study site.

identical. Mean size was virtually unchanged from April to June, increased abruptly in July, and gradually declined through October. At VABI in 1978, the mean size of pregnant females followed an erratic trend.

It is noteworthy that in every case, the mean size of pregnant females peaked during the mid-summer depression in pregnancy percentages. In every case, the few females that continue to reproduce during the mid-summer slump are large in size. Small females, normally sexually active, cease reproduction during the slump period.

Brood Size.

Over the two years of study, brood sizes ranged from a minimum of [illegible] to a maximum of 54. The largest brood sizes discovered at the three sites were as follows: VABI, a 38.8 mm SL female with 47 embryos, collected June, 1978; TOWY, a 39.4 mm SL female with 41 embryos, collected April, 1978; BCHRD, a 41.6 mm SL female with 54 embryos, collected June, 1977. Mean brood sizes were generally similar at VABI and TOWY, generally in the range of 5-15. At BCHRD, brood sizes were substantially larger, generally in the range of 12-26 (Figures 3-5; Appendix Table 96).

There is a general positive correlation between female size and brood size; i.e., larger females have larger broods (see details later under Size Specific Fecundity). Thus, it is not surprising that the curves for mean pregnant female size and mean brood size track one another rather closely. Thus the temporal and spatial differences in mean brood sizes must be interpreted in light of mean female sizes. Appendix Table 97 shows that when a comparable size class of females is compared, many of the dramatic differences between months and between sites disappear.

Size Specific Fecundity

The linear regression relationships for brood size on female length in monthly samples taken at the three study sites are shown in Figures 6-8 (1977) and 9-11 (1978). Statistical data for these graph lines are given in Appendix Tables 98 and 99. For months where the regression was not significant ($p > 0.05$) and/or the number of pregnant females was less than 10, the regression line was not graphed.

Covariance analysis was performed on the monthly regressions from a given site in one year, using a $\log_{10}$ transformation of brood size to reduce heterogeneity of variances among the lines (see Methods and Materials). In all six year-station comparisons, the F-test was highly significant ($p < 0.01$), indicating that there were significant differences among the monthly regressions. The monthly regressions then were subjected to a Newman-Keuls multiple comparison test for direct comparison of slopes and intercepts to determine which lines were significantly divergent. This test successfully identified divergent lines in all cases except the BCHRD, 1977 and BCHRD, 1978 data sets. Although the covariance F-test was highly significant in both cases, indicating significant variability among the monthly lines, the Newman-Keuls procedure failed to identify which lines were divergent. Although somewhat

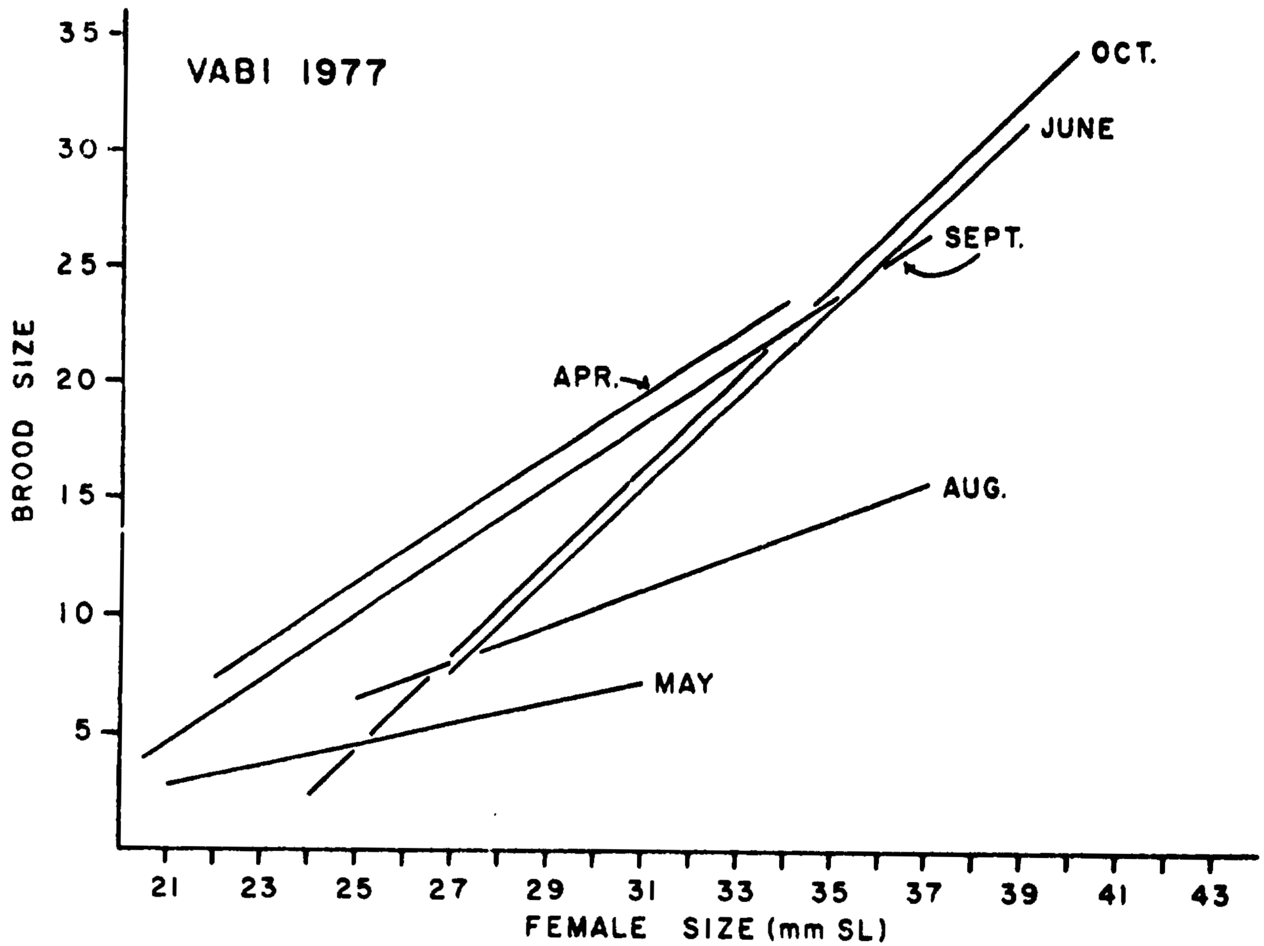

Figure 6. Least-squares linear regression lines for brood size on female length calculated from monthly samples of the sailfin molly (Poecilia latipinna) collected at the VABI study site in 1977. Lines based on a monthly sample size of less than 10 or where the regression was not statistically significant (p=0.05) are not shown. See Appendix Table 98 for statistical details.

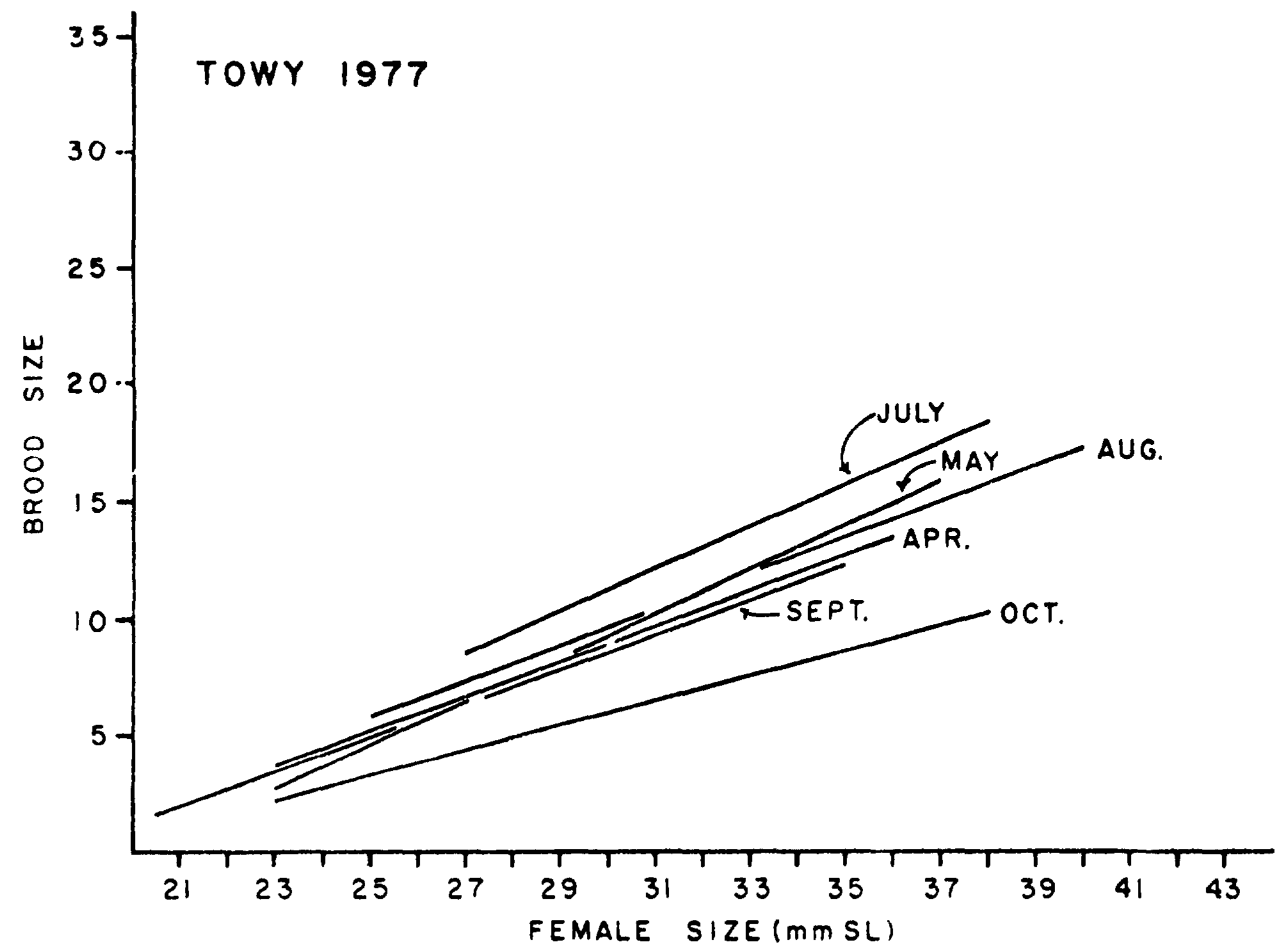

Figure 7. Least-squares linear regression lines for brood size on female length calculated from monthly samples of the sailfin molly (Poecilia latipinna) collected at the TOWY study site in 1977. Lines based on a monthly sample size of less than 10 or where the regression was not statistically significant ($p=0.05$) are not shown. See Appendix Table 98 for statistical details.

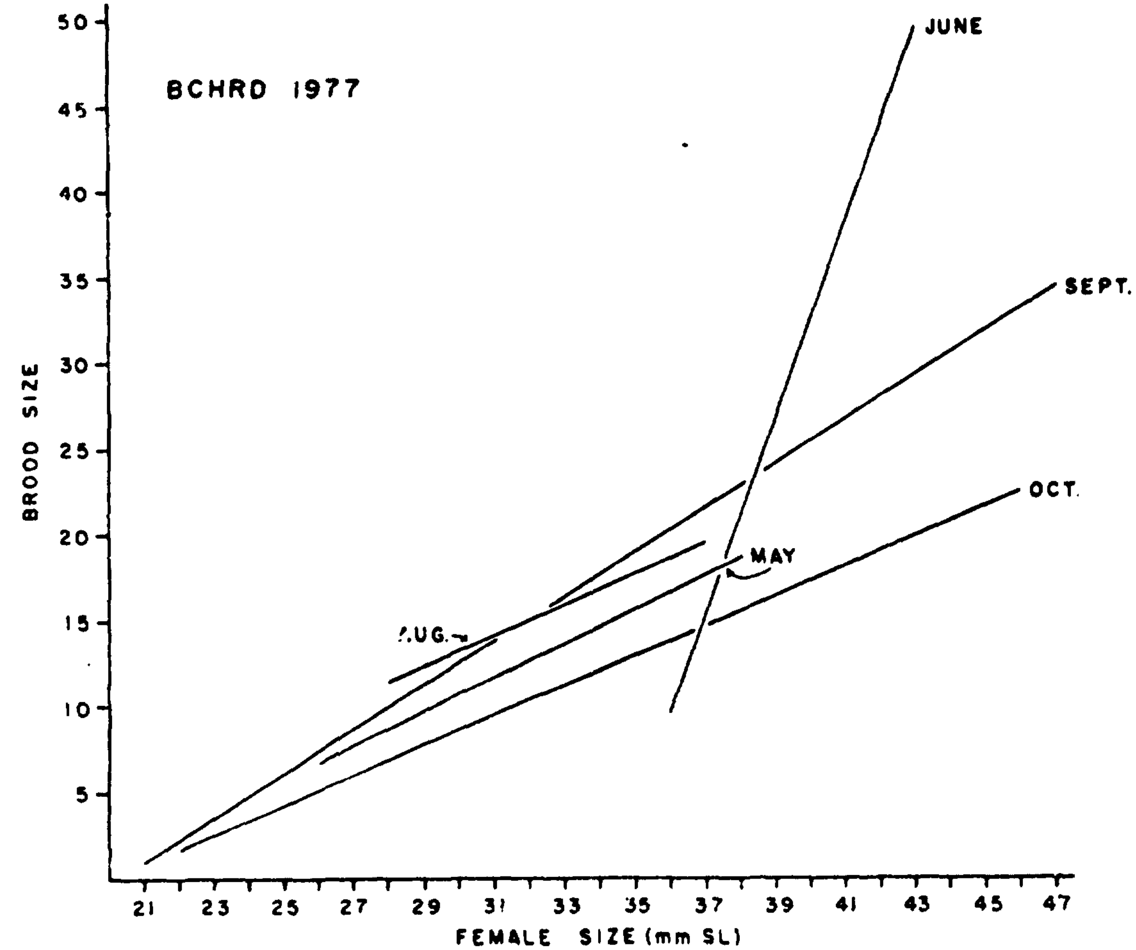

Figure 8. Least-squares linear regression lines for brood size on female length calculated from monthly samples of the sailfin molly (Poecilia latipinna) collected at the BCHRD study site in 1977. Lines based on a monthly sample size of less than 10 or where the regression was not statistically significant ($p=0.05$) are not shown. See Appendix Table 98 for statistical details.

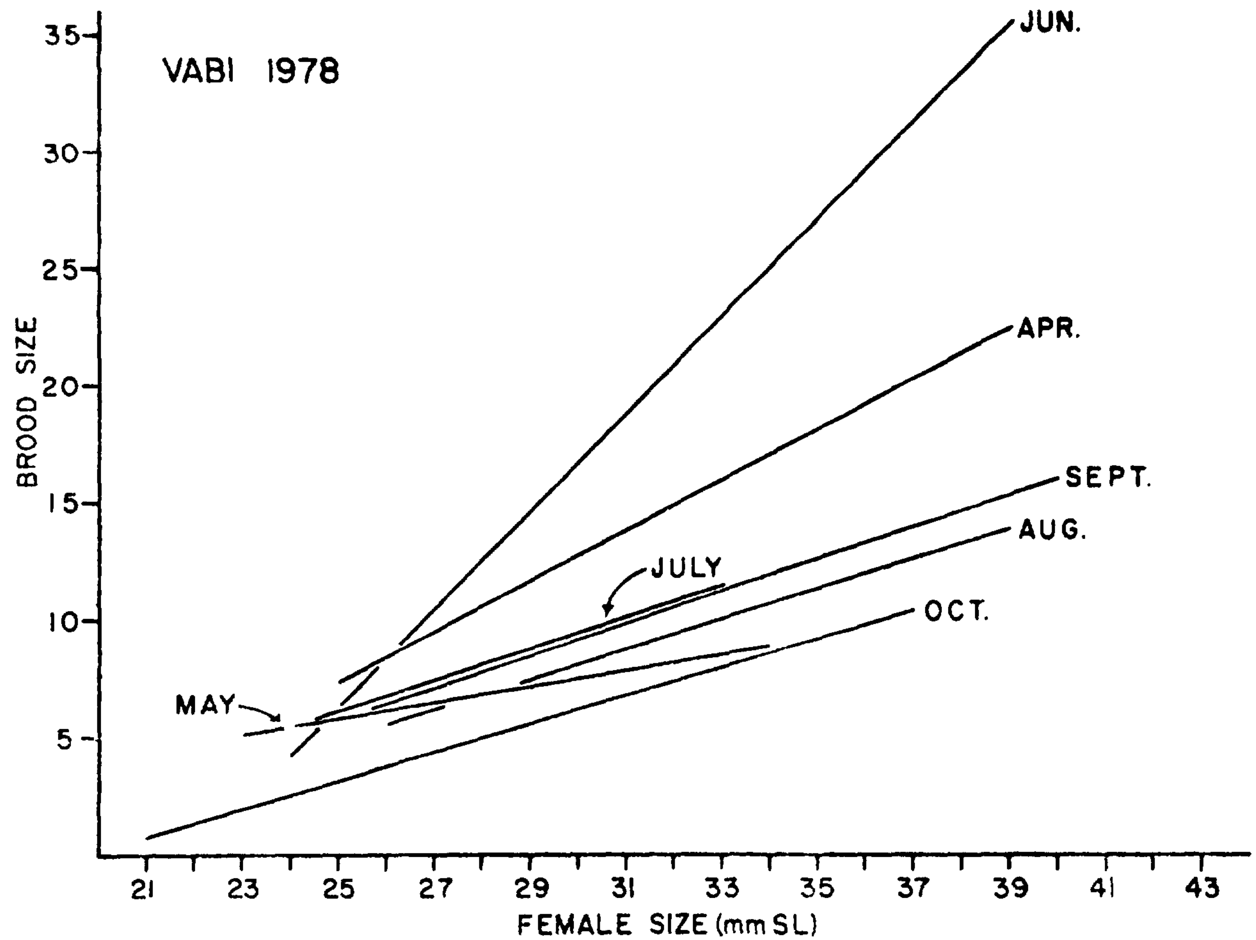

Figure 9. Least-squares linear regression lines for brood size on female length calculated from monthly samples of the sailfin molly (Poecilia latipinna) collected at the VABI study site in 1978. Lines based on a monthly sample size of less than 10 or where the regression was not statistically significant (p=0.05) are not shown. See Appendix Table 99 for statistical details.

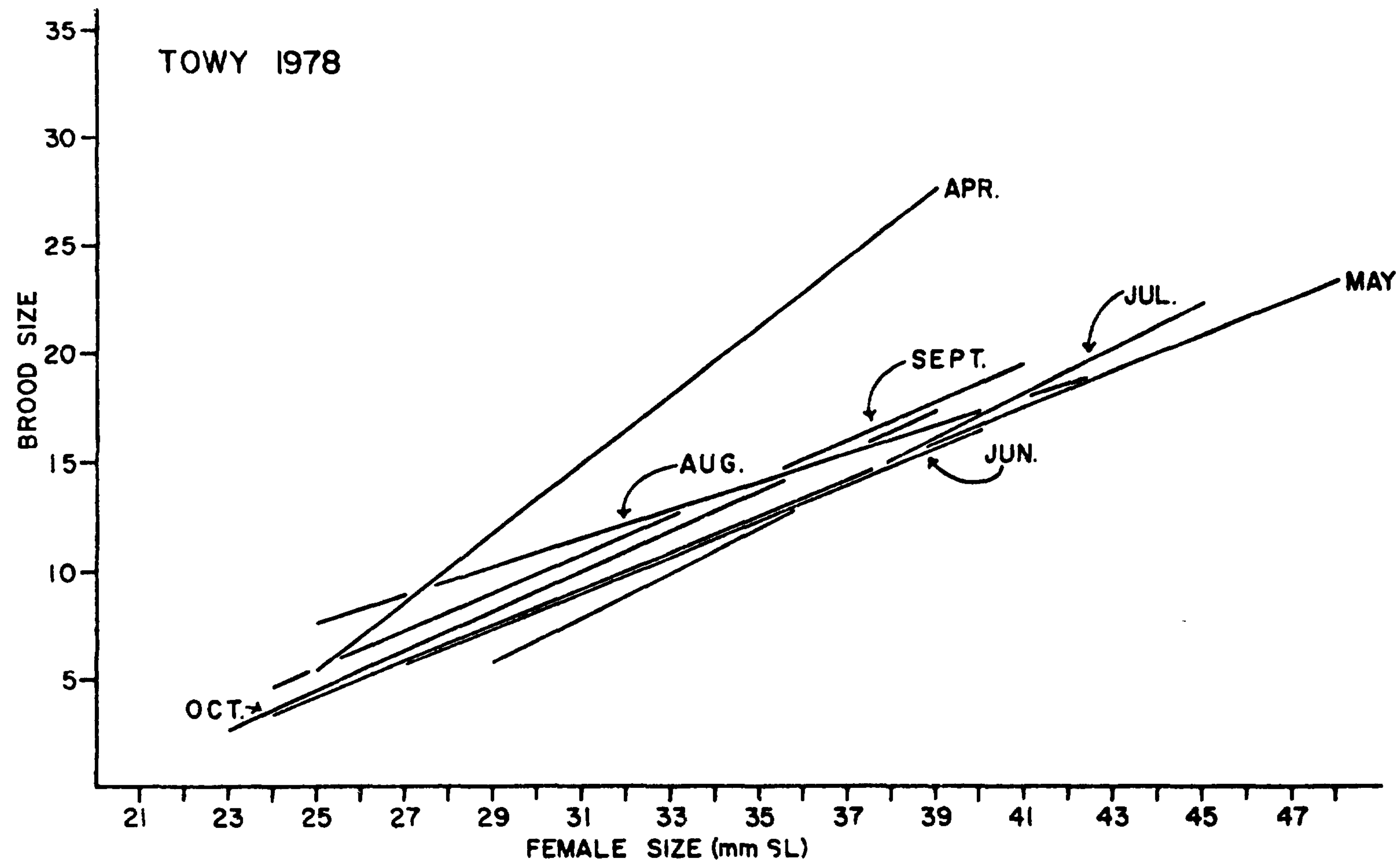

Figure 10. Least-squares linear regression lines for brood size on female length calculated from monthly samples of the sailfin molly (Poecilia latipinna) collected at the TOWY study site in 1978. Lines based on a monthly sample size of less than 10 or where the regression was not statistically significant (p=0.05) are not shown. See Appendix Table 99 for statistical details.

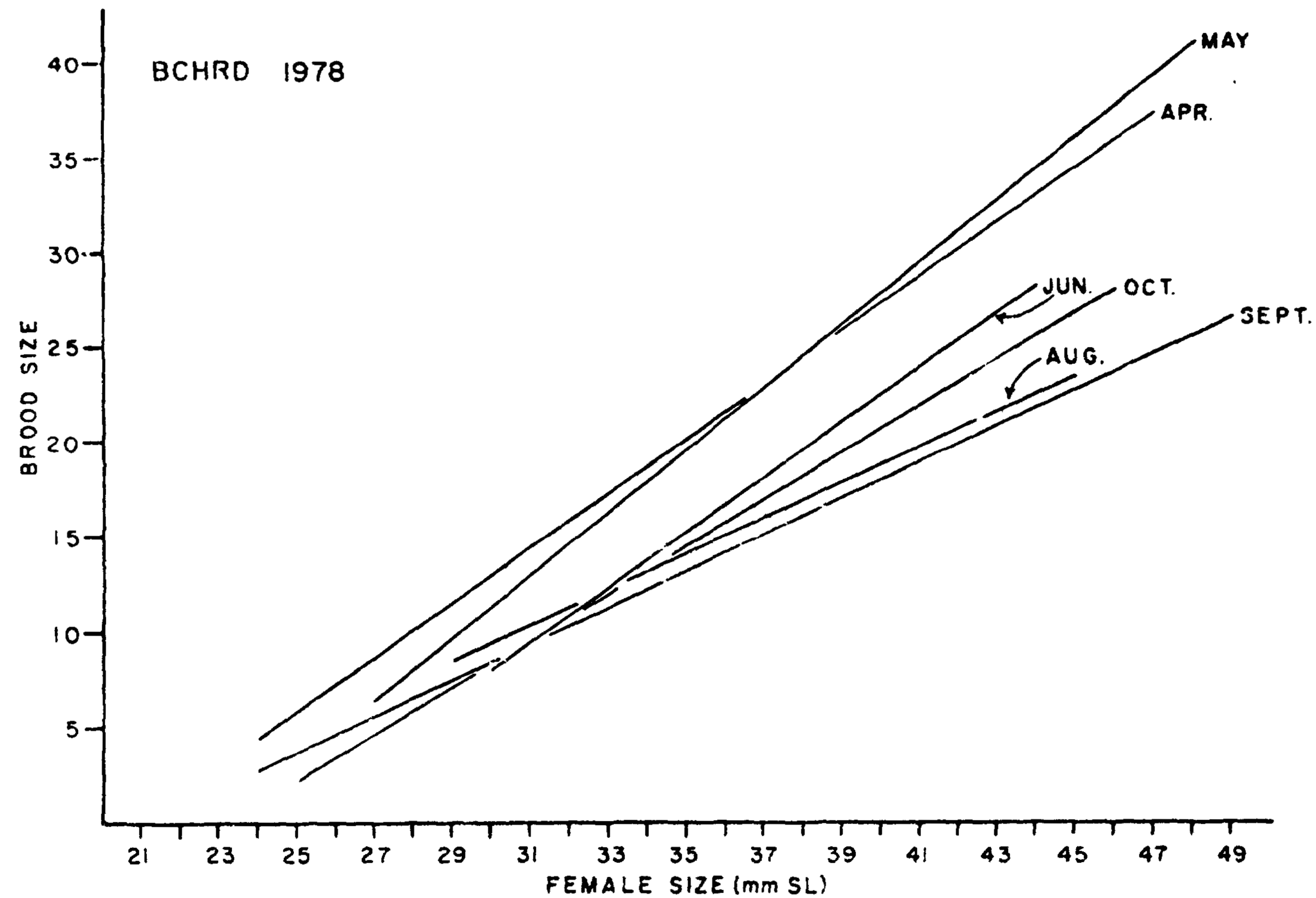

Figure 11. Least-squares linear regression lines for brood size on female length calculated from monthly samples of the sailfin molly (Poecilia latipinna) collected at the BCHRD study site in 1978. Lines based on a monthly sample size of less than 10 or where the regression was not statistically significant (p=0.05) are not shown. See Appendix Table 99 for statistical details.

unusual, this problem is not extraordinary. It results from the fact that the F-test is a much more "powerful" procedure than the Newman-Keuls test (Zar, 1974).

After applying the Newman-Keuls test, the monthly regressions showing no significant differences among themselves were pooled and a common regression was calculated. Significantly divergent lines were graphed independently. For the BCHRD, 1977 and BCHRD, 1978 data sets, there was no alternative but to pool all the monthly lines into one, even though covariance analysis had revealed significant differences among the lines. The results of these procedures are shown in Figures 12 and 13 and Appendix Tables 100 and 101.

It is noteworthy that the regression lines for monthly samples can vary significantly. Size specific fecundity is not a stable relationship, but can vary both spatially and temporally. This means that size-specific fecundity is a third and potentially powerful mechanism for adjusting reproductive output.

The monthly pattern of variability in regression lines followed no regular trend but often was associated with the pattern of variation of replacement index (RI) (Figure 14). For example, the June and October, 1977 peaks in RI at VABI corresponded to the two steepest regression lines (Figure 6). Likewise, the dramatic April and May, 1978 peak in RI at BCHRD coincided with steep slopes for those two monthly regressions (Figure 11). However, there are some cases (e.g., September and October, 1978 at BCHRD) where RI peaks were not associated with unusual size-specific fecundity (Figure 11). Furthermore, in some cases, outstanding regression lines, such as June, 1978 at VABI (Figure 9) and June, 1977 at BCHRD (Figure 8) were associated with low to moderate performance in RT (Figure 14). Finally, there was no clear pattern of seasonality in the regressions. Either high or low-slope regression lines were likely to occur at any time during the reproductive season.

Pooling the monthly regression lines and comparing among years, the most noteworthy observation is that at TOWY and BCHRD, the overall regressions for the two years are nearly identical, whereas, at VABI, the 1977 line has a much higher slope than the 1978 line (Figures 12 and 13). Only the month of June, 1978 approached the steepness of the pooled 1977 regressions.

Replacement Index

The replacement index is a single number generated from each monthly data set that reflects, in a static sense, the reproductive output of the population. Since it is influenced by the interaction of pregnancy percentages, size distribution of pregnant females, and size-specific fecundity, different reproductive strategies could result in similar index values. This needs to be kept in mind when evaluating replacement index.

In all three study stations, replacement index exhibited spring or early summer peaks, mid-summer slumps, and late summer or fall peaks in reproductive output during the 1977 season (Figure 14). At VABI,

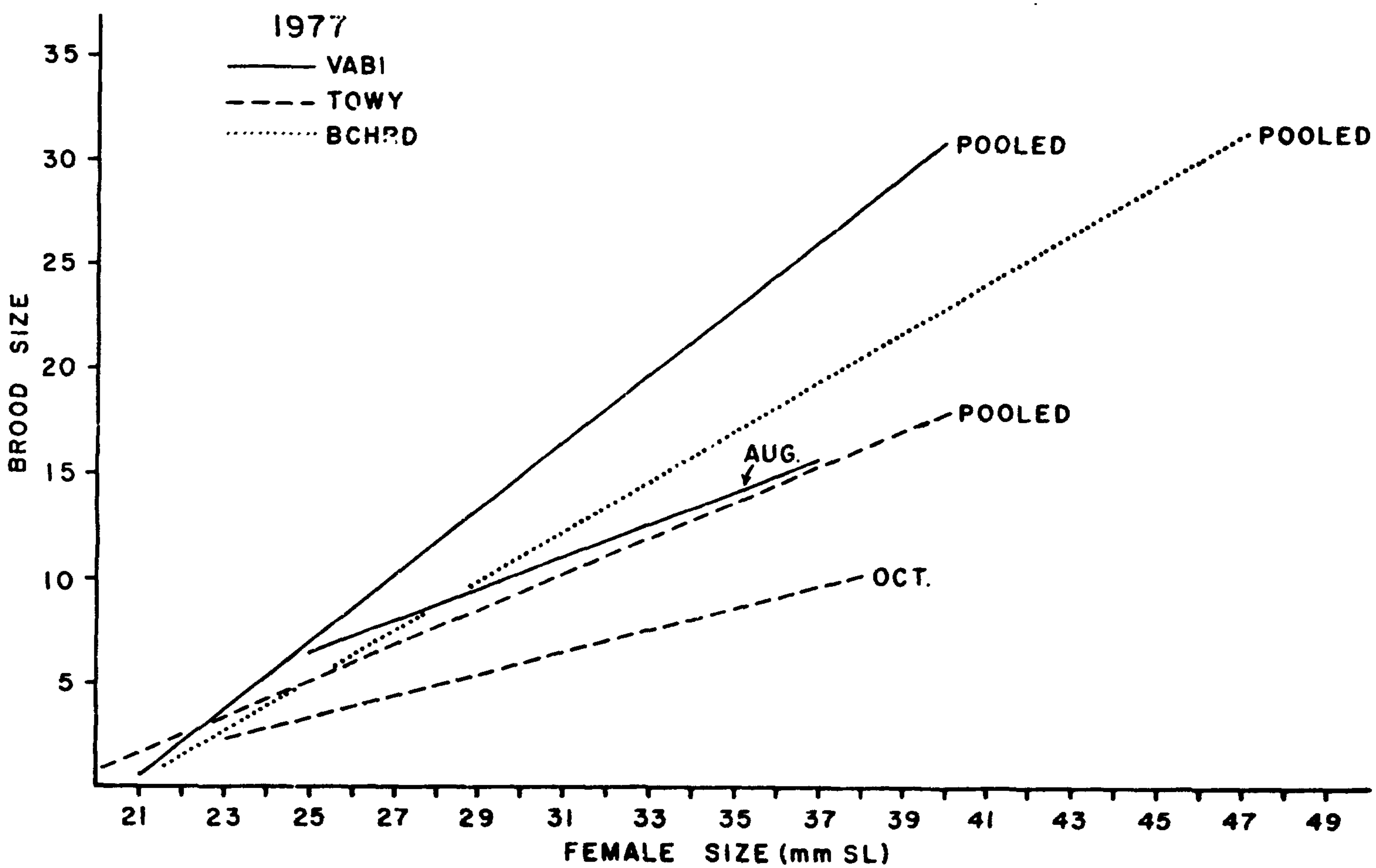

Figure 12. Least-squares linear regression lines for monthly and pooled samples of the sailfin molly (*Poecilia latipinna*) collected at three study sites in 1977. See Appendix Table 100 for statistical details.

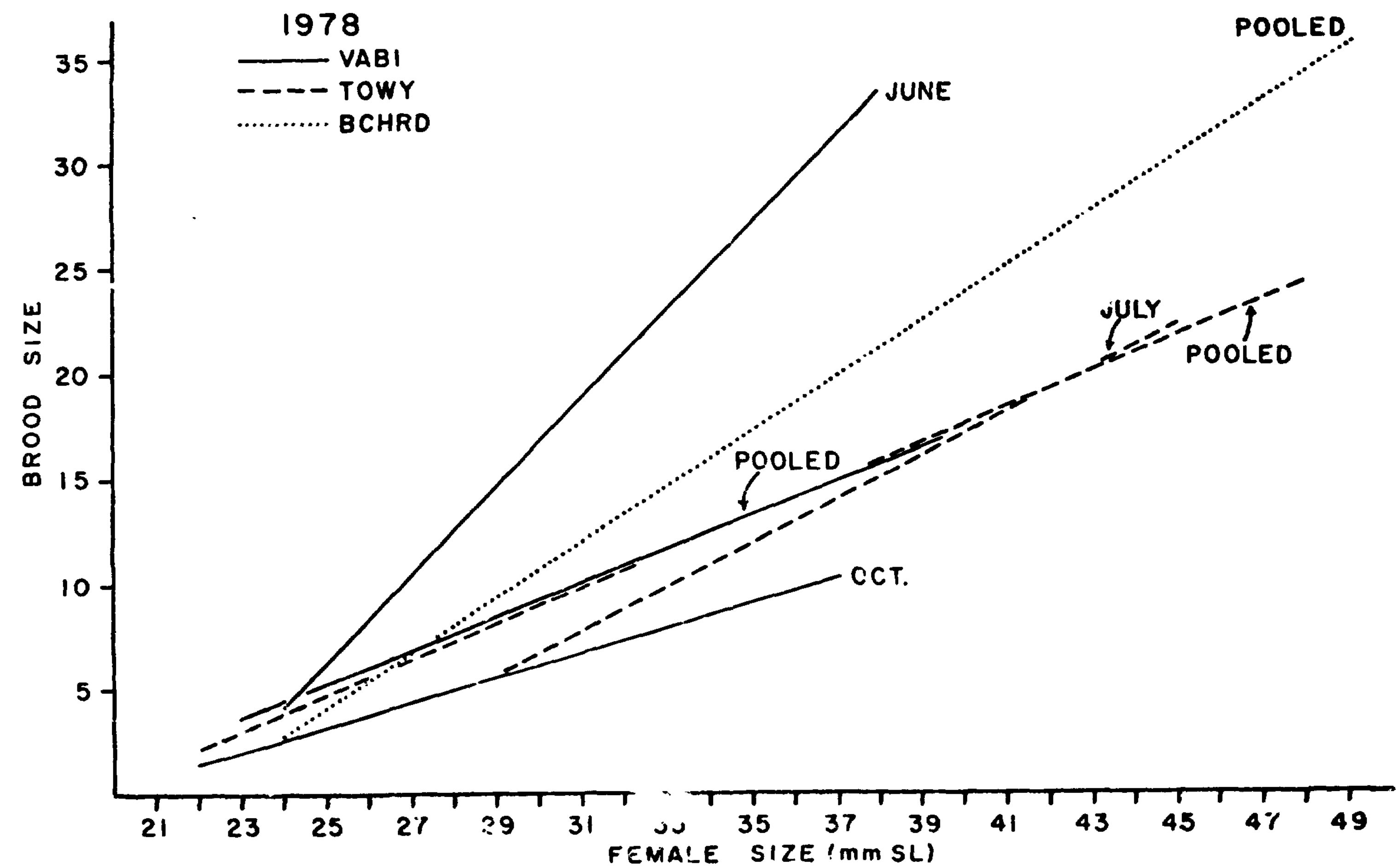

Figure 13. Least-squares linear regression lines for monthly and pooled samples of the sail-fin molly (Poecilia latipinna) collected at three study sites in 1978. See Appendix Table 101 for statistical details.

reproduction was modest in April, May, August, and September, and was dramatically elevated in June and October. The June peak coincides with a peak in pregnancy percentage, a high size-specific fecundity relationship, and a high (but not maximal) mean pregnant female size. The October peak coincides with a high size-specific fecundity relationship, and a large mean pregnant female size.

At TOWY in 1977, the peaks in replacement index were very modest, and fell in May and August. The mid-summer slump was about equally expressed in June and July. Despite a high pregnancy percentage in May, the replacement index was a modest 2.1, since the mean pregnant female size and the size-specific fecundity relationship were not very large. In August, the replacement index (2.2) was nearly identical to May. However, it was achieved through a moderate pregnancy percentage, a large mean size of pregnant females, but size specific fecundity relationship nearly identical to May.

At BCHRD in 1977, the replacement index reached a very modest "peak" in May and June, was minimal in July, and peaked dramatically in September. In May a replacement index value of 1.2 was achieved with a modest pregnancy percentage, a modest size-specific fecundity relationship, and a very low mean pregnant female size. In June the value of 1.3 was achieved despite the dramatically high size specific fecundity and moderately high mean pregnant female size. Both of these features were counteracted by a low pregnancy percentage. The September peak in replacement corresponded to a dramatic peak in pregnancy percentage and a high size-specific fecundity, but a low mean pregnant female size.

In the 1978 data, general trends in the replacement index curve are less consistent. At BCHRD, there is a dramatic April-May peak, an equally dramatic July slump, and a second peak in September-October. At VABI, there were May and October low-points, and modest replacement through the remainder of the year, with an unspectacular "peak" in September. At TOWY, there is a hint of May-June and August peaks, with a slight depression in July, and a gradual linear decline in September and October.

Environmental Analysis

The data for the physical, chemical, and biological parameters measured at each molly study site are presented in Appendix Tables 102-116 and are summarized in Table 1. Temperature, salinity, and water depth are displayed graphically in Figures 15-17.

The 1977 year had much less rainfall than 1978, especially during the winter and early spring (Table 3). The data are incomplete for 1978 (due to the termination of data collection by the weather service); but from January through May of 1977, 19.25 cm was recorded; whereas 33.19 cm was recorded in 1978. The ten-year average for those four months is 25.37 cm. Thus, the winter and spring of 1977 was a little drier than average, and the same period in 1978 was much wetter than average.

In 1977, water levels reached their lowest point in early May at all three sites, and there was a partial recovery in June. After June, water

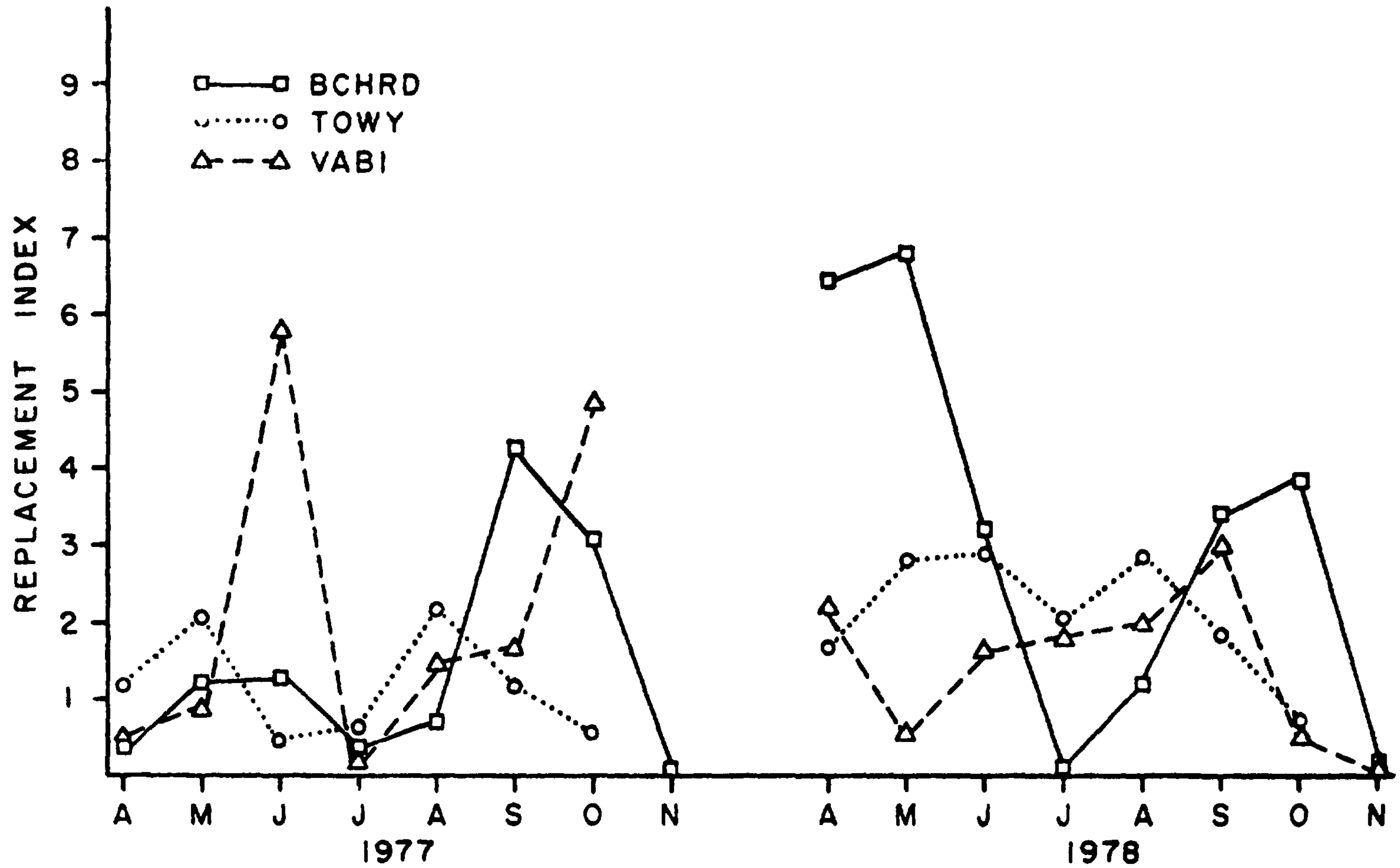

Figure 14. Replacement index for monthly samples of the sailfin molly (*Poecilia latipinna*) from three study sites.

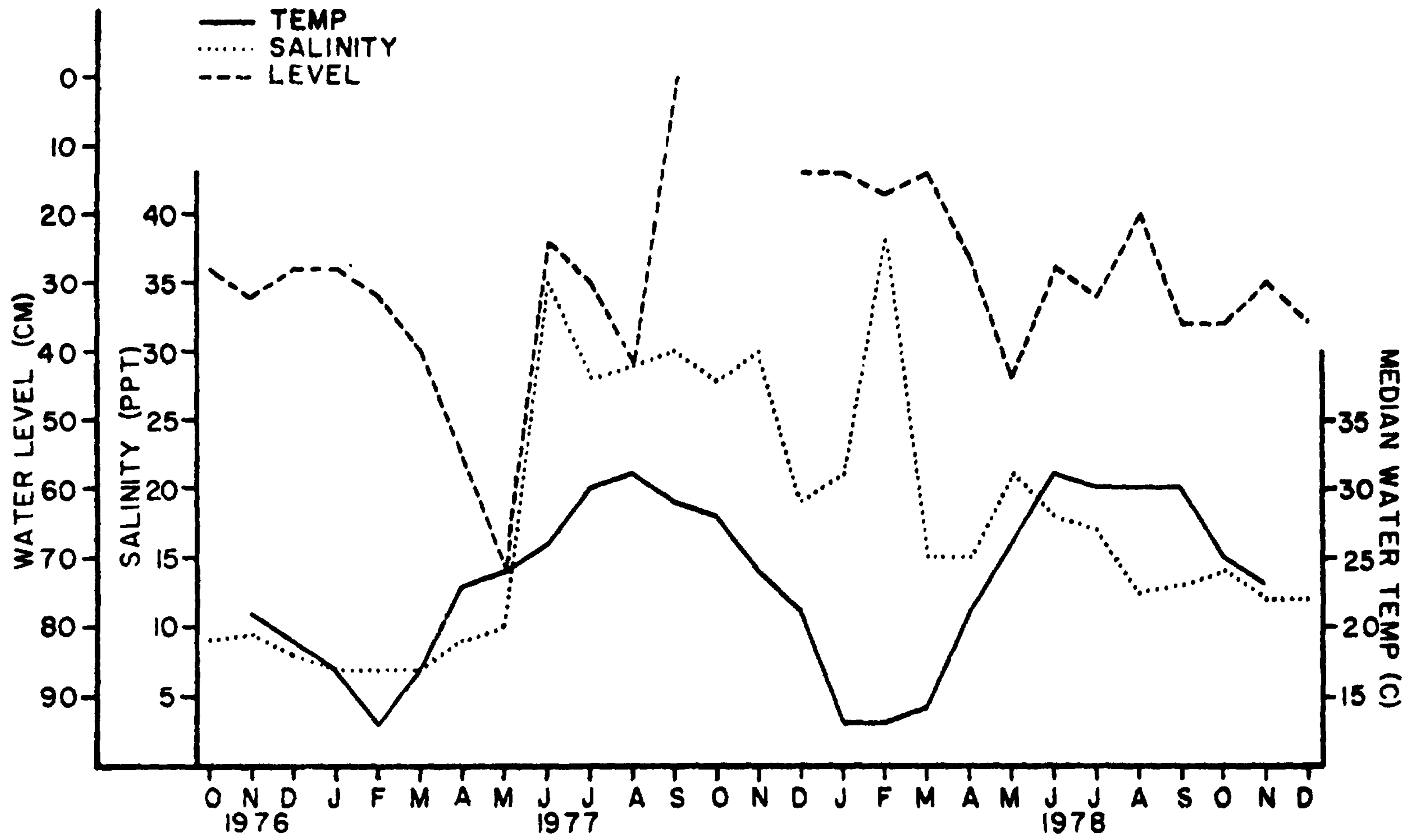

Figure 15. Graph of average median surface water temperature, salinity, and water level measured monthly at the VABI sailfin molly study site, October, 1976 to December, 1978. Salinity was measured at the time of fish sampling. The highest water level measured was recorded as zero, and other monthly readings are recorded as cm below zero. The average median water temperature was for the 15-day period preceding the monthly fish sample. Breaks in the graph lines represent missing observations.

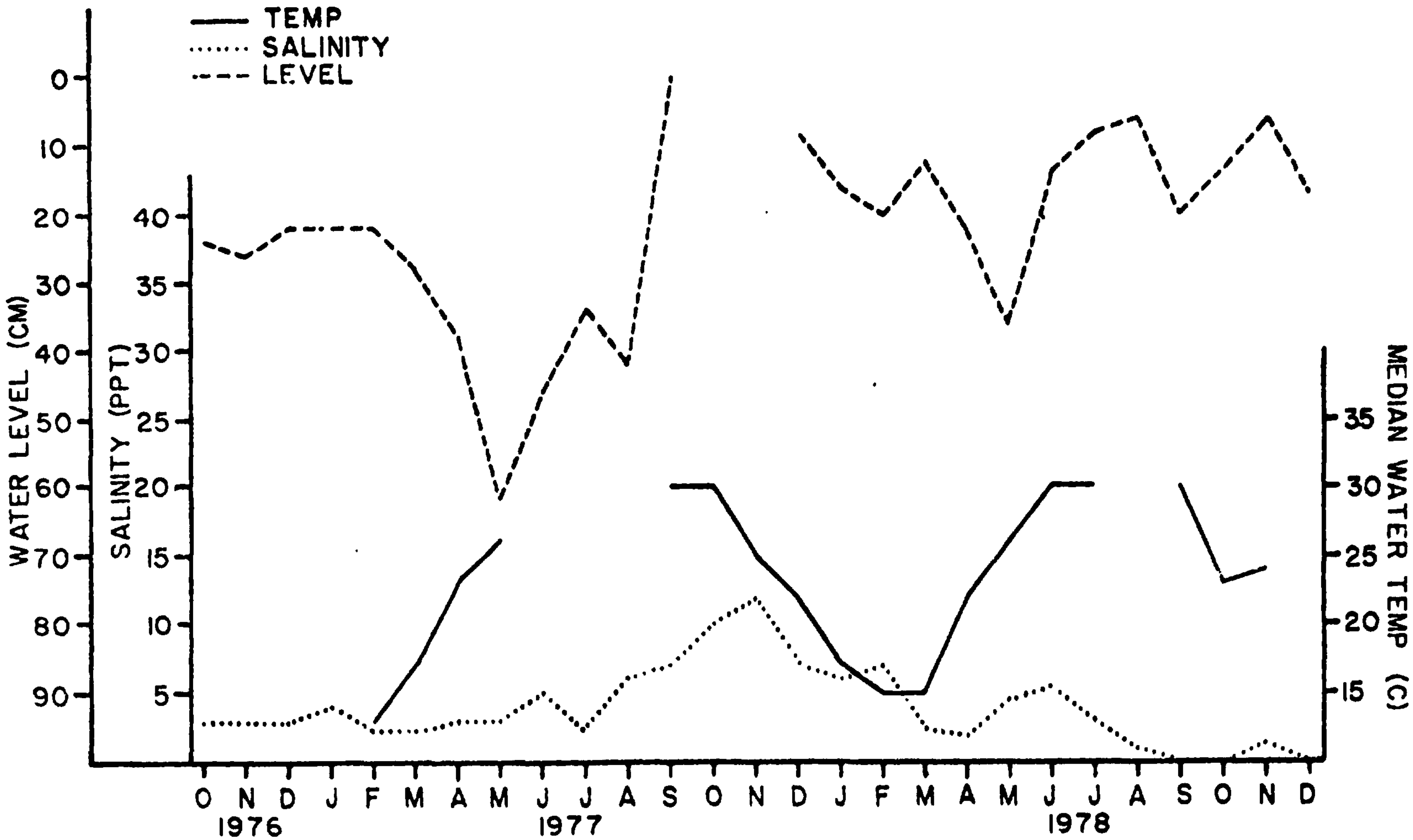

Figure 16. Graph of average median surface water temperature, salinity, and water level measured monthly at the TOWY sailfin molly study site, October, 1976 to December, 1978. Salinity was measured at the time of fish sampling. The highest water level measured was recorded as zero, and other monthly readings are recorded as cm below zero. The average median water temperature was for the 15-day period preceding the monthly fish sample. Breaks in the graph lines represent missing observations.

Figure 17. Graph of average median surface water temperature, salinity, and water level measured monthly at the BCHRD sailfin molly study site, October, 1976 to December, 1978. Salinity was measured at the time of fish sampling. The highest water level measured was recorded as zero, and other monthly readings are recorded as cm below zero. The average median water temperature was for the 15-day period preceding the monthly fish sample. Breaks in the graph lines represent missing observations. The circled dot is the median water temperature for September, 1978.

Table 3
Monthly rainfall (in cm.) measured at Kennedy Space Center, Florida, during the period 1973-1978. The 10-year average is based on the years 1968-1977. Data provided by NOAA National Weather Service.

	1973	1974	1975	1976	1977	1978	10-year Average
January	15.01	0.51	1.83	2.16	4.95	5.38	4.19
February	3.66	1.07	1.09	0.30	5.69	14.40	4.75
March	9.96	4.70	2.64	1.24	0.64	6.30	5.78
April	3.61	2.84	3.02	0.56	1.80	0.43	2.16
May	4.42	3.66	11.13	16.05	6.17	6.68	8.49
June	13.82	29.03	27.97	25.22	8.46	14.35	20.54
July	8.69	27.69	23.47	5.31	9.40	38.94	12.87
August	23.65	21.49	6.38	11.40	11.68	4.55	13.67
September	9.50	12.17	18.42	21.13	11.89	12.62	11.72
October	8.05	12.90	8.53	3.35	4.70	-	11.83
November	1.88	2.06	3.45	9.83	16.41	-	6.21
December	5.97	6.17	0.43	11.66	11.23	-	5.86
Total	108.20	124.28	108.36	108.23	93.01		108.07

levels generally continued to rise throughout the remainder of the reproductive season. In 1978, levels also were lowest in May, but dessication was not nearly so severe as in 1977. At all three sites, water levels rose back to "normal" levels in June, 1978, and generally remained high throughout the remainder of the 1978 reproductive season.

Water temperatures followed a predictable annual pattern and generally were similar at all three sites. Lowest water temperatures are reached during the period from mid-December to mid-February. Average water temperatures of around 30°C or higher were maintained through the mid-summer period, from mid-May to mid-September, depending on site. Unfortunate mechanical problems with the recording thermographs resulted in many missing data points, and detailed comparisons between sites cannot be drawn. It does appear that BCHRD was the warmest site in 1977, and that VABI and TOWY had similar temperature regimes during the summer of 1978.

Discussion

Of the several physical, chemical and biological parameters measured during this study, quantitative and qualitative evaluation suggests that two, temperature and water level, are of major significance in explaining the patterns of reproduction observed.

Water temperature, especially in conjunction with photoperiod, has been shown to be a dominant factor controlling the initiation of reproduction, both in fishes in general (de Vlaming, 1972) and in P. latipinna in particular (Grier, 1973). The effect of high temperatures on reproduction of the sailfin molly was first noted by Snelson (1976) and is confirmed herein and by two fortuitous laboratory experiments. P. latipinna ceases to reproduce at some temperature between 32°C and 35°C. Laboratory fish held at 31°C and 32°C in two separate experiments reproduced and grew normally. Mollies held at 35°C grew at a very reduced rate, ceased to reproduce completely, and exhibited unusually high mortality.

The stress temperature of 35°C and above was recorded regularly at all three study sites during mid-summer months. The temperature lines in Figures 15-17 show the average daily median surface temperature. Reference to Appendix Tables 102-116 shows that average daily maximum temperatures nearly always exceeded 32°C in mid-summer. In order to achieve average maxima ranging from 32-35°C, many readings above this range were included, some as high as 39°C.

The determination of a specific surface water temperature at one spot in a large habitat clearly does not reflect precisely the temperature regime that a free-ranging fish is exposed to. Temperatures vary in a micro scale throughout a body of water. The response of many fish species in laboratory thermal gradient experiments demonstrates conclusively that fish are capable of discriminating between temperatures and selecting comfortable ranges (Murray, 1971).

In this context, water temperatures probably interact in a complex fashion with other variables to produce stressful conditions. In the three molly study areas, the most important interaction appears to be with water

Table 4

Mean monthly air temperatures (°C) measured at Kennedy Space Center, Florida (O & C Building) during the period January, 1973 to August, 1978. The 12-year mean is for the period April, 1965 to December, 1977. Data provided by NOAA - National Weather Service.

	1973	1974	1975	1976	1977	1978	12-Year Mean
January	16.4	21.2	19.0	13.6	10.8	13.1	16.7
February	14.0	16.3	19.3	16.6	13.4	12.2	15.9
March	20.4	20.9	19.7	20.4	20.6	18.5	19.3
April	20.6	21.3	21.7	20.7	21.4	21.7	21.9
May	23.7	24.4	24.7	23.2	23.7	24.3	24.1
June	25.8	25.5	25.7	24.9	26.3	26.6	25.8
July	26.6	25.7	25.9	26.7	26.9	27.1	26.7
August	26.5	26.8	26.7	26.4	27.2	27.4	26.9
September	26.7	27.2	25.8	25.7	26.8	-	25.8
October	23.9	22.8	24.1	22.5	21.9	-	23.8
November	21.7	19.9	19.7	17.4	19.9	-	19.6
December	15.8	16.3	15.9	15.9	15.8	-	17.1

depth. When water stages are high, habitat space is increased, often dramatically, by the flooding of extensive areas. During high water, conditions for mollies appear to be optimized in three respects. (1) There is a greater opportunity for the fish to avoid extreme temperatures (high or low) because of the greater range of temperatures available between exposed water *vs* shaded water, shallow water *vs* deep water, and surface zone *vs* bottom zone. (2) In addition, the expanded habitat space under flooded conditions should reduce densities of fish and moderate the effects of competition and potentially stressful social interactions among individuals. We are just beginning to understand the influence of social factors on poecillid reproductive systems (Baird, 1968, 1974; Borowsky, 1973; Martin, 1975; Sohn, 1977). (3) Finally, food resources for mollies are increased dramatically under high water conditions. Mollies primarily are "herbivores", feeding on a combination of periphyton, detritus, and algae, with the rare inclusion of some animal matter (Harrington and Harrington, 1961). Flooding promotes the production and availability of the primary food sources of *P. latipinna*. Numerous studies have shown the importance that food resources play in the control of fish reproduction (e.g., Hester, 1964; Bagenal, 1969; Wooton, 1973).

Much of the variation in molly reproduction observed in this study and in earlier work (Snelson, 1976) can be interpreted as a result of the interplay between temperature and habitat volume.

The interaction between temperature and water depth probably explains the annual pattern of spring and fall reproductive peaks, with a depression of reproduction in mid-summer. This pattern was observed in 5 out of 6 cases in this study (Figure 14) and in 2 out of 4 cases by Snelson (1976).

Although reproduction normally began in April, only the largest overwintering females reproduced in the first month. In May and June, the full size range of adult females reproduced. During those months, median water temperatures were in the middle to upper 20's C and water levels either were at their lowest or recently had increased abruptly, due to heavy June rains or pumping. Low water conditions in the spring may not greatly stress the mollies for two reasons. First, water temperatures are low and optimal for reproduction, not complicating the crowded conditions and adding to the possibility of dissolved oxygen stress. Secondly, the level of reproductive output in the spring and early summer months may not be determined by food availability at that time. Although low water and crowded conditions would be expected to increase competition for food, the fertility and fecundity exhibited in spring months may be more dependent on energy reserves accumulated during the winter than on food resources immediately available.

The mid-summer depression in reproduction ranged from slight to dramatic in 5 of the 6 cases reported herein, and in 2 of the 4 cases reported by Snelson (1976). The depression normally was most severe in July, but occasionally was expressed as early as June or as late as August (Figure 14). The period of lowest reproduction coincided with the period of maximum temperatures. Even though the mollies may have some ability to avoid extreme temperatures, it is likely that many fish may be inadvertently "trapped" in areas where temperatures exceed 32°C, especially during the day. The effect of high temperatures would be most dramatic in low water conditions, where the few remaining bodies of water may be shallow and uniformly heated from surface to bottom. Even if water levels were high during the reproductive slump, the depressed reproduction might be a consequence of low water levels a month or two prior, when resource limitations resulted in subsequent reduction in fecundity or fertility. It is significant that mean size of pregnant females goes up dramatically during the peak of the summer slump; i.e., only large females continue to bear young during the period of minimum reproduction.

A late summer or fall peak in reproduction was expressed weakly to strongly in all 6 instances recorded herein, and in 2 of the 4 cases reported by Snelson (1976). The peak occurred in August, September, or October. A late-season peak as early as August or September is not easy to resolve in terms of an interaction between temperature and water level. Temperatures usually remain at summer-time high levels through the middle of September. Perhaps the fact that water levels are characteristically high in late summer and fall is significant, permitting fish to avoid stressful temperatures. It is noteworthy that August "peaks" all are minimal. Dramatic late-season peaks all occured in September and/or October, after water temperatures had begun to drop. In all cases, the fall peak(s) in replacement index is correlated with peak(s) in pregnancy percent. This reflects that the late-season peak is associated with resumption of reproduction by those individuals inhibited during the mid-summer depression, not by any dramatic shift in size-specific fecundity or size of the reproducing fish.

To a considerable degree, the differences in reproductive performance between sites and between years can be explained by the temperature-water level hypothesis. Following the record-breaking cold winter of 1976-77 (Table 4), the spring of 1977 was unusually dry (Table 3), causing water levels to fall rapidly to extremely low levels. Because of the differences in basic configuration, low water conditions have a dramatic impact on VABI and BCHRD, especially the latter. Both sites have extensive surface area where depths are .2 to .5 m in depth under normal conditions. When water levels drop, all the fish from these extensive "flats" are crowded into a few remaining deep holes and ditches. At TOWY, by contrast, lowered water levels have minimum impact. This site has only one shallow marginal "flats" zone connected to a very long, deep ditch, "U-shaped" in cross section. Lowered water levels cause the marginal shallow area to become more shallow, but the zone never dried completely during our study, even in May, 1977. Thus this area never became unavailable as fish habitat, even if some fish did vacate the area because of its extreme shallowness. Those fishes that were forced from the shallow zones moved into the deep adjacent ditch, whose surface area was not noticeably reduced during low-water conditions. As a result of basin configuration, TOWY is a more stable habitat than VABI or BCHRD, and fish are less likely to be stressed by over-crowding, competition, heat, or low dissolved oxygen concentrations during dry periods.

The winter of 1977-78 was colder than average (Table 4), but was not nearly as severe as the preceding winter. In addition, the winter and spring of 1978 were very wet, compared to 1977 (Table 3). As a result of reduced springtime dessication, the water levels remained higher at all three sites in 1978. At TOWY, there was virtually no change in available habitat in 1978. At VABI and BCHRD, there was noticeable habitat restriction, but it lasted only about 30 days. VABI was pumped immediately after the May dessication period in 1977, causing water levels to rebound quickly. With this exception, the water levels at TOWY and BCHRD rose to normal levels by June in 1978, and they remained high during the entire summer. In contrast, the water levels at both sites remained relatively low through mid-summer in 1977, and did not reach normal levels until September. This difference is related to rainfall. In 1977, only 41.43 cm fell at KSC between June and September, whereas in 1978 the value was 70.46 cm (Table 3).

In keeping with the more stable nature of the habitat, the reproductive output at TOWY was much less variable, compared to the other two sites, both in 1977 and 1978. There were no dramatic peaks. Although reproduction was depressed noticeably in June and July of 1977, there was only a very minor depression in 1978. Finally, a higher water level through the summer of 1978 seems to have resulted in generally higher levels of reproduction in 1978 than in 1977 (Figure 14). At VABI and BCHRD in 1977, both populations had minimal reproduction in July, recovered slightly higher in August, and then displayed a dramatic fall peak in October (VABI), or September and October (BCHRD). The two sites, however, differed conspicuously in the spring pattern of reproduction in 1977. At VABI, there was a dramatic peak in June, but there was no noteworthy spring peak in BCHRD (Figure 14).

In 1978, VABI had a much more uniform level of reproductive output than in 1977. There was a depressed period in May, but generally moderate reproduction continued throughout the summer, with a small peak in September. (Figure 14). At BCHRD, the 1978 replacement index curve shows much more exaggerated variation than in 1977. There was a dramatic April-May peak (not present in 1977), followed by a virtual cessation of reproduction in July, and a second peak period in September and October (Figure 18).

This analysis leaves many questions unanswered, and raises many new questions concerning the causes of variation between sites and between years. For example, what causes differences in the level of reproductive output at comparable times, such as at BCHRD in the spring of 1977 and the spring of 1978 (Figure 14)? Why was overall replacement index at TOWY higher in 1978 than 1977 while at VABI the reverse occured? Finally, why should reproduction at a relatively stable, favorable site such as TOWY not achieve uniformly high levels approaching the peaks demonstrated at VABI and BCHRD? The answers to these and other questions require additional research and a more extensive period of field monitoring.

Summary

The objective of this study was to learn as much as possible about reproduction in a representative fish species characteristic of the waters around Kennedy Space Center. The data gathered would constitute a "before" baseline on reproductive performance in the selected fish. By continuing to monitor reproduction during and after the initiation of space shuttle operations, it was hoped, it might be possible to identify sublethal environmental changes adversely affecting normal reproduction in the species. Altered reproductive performance could constitute an early warning of subtle environmental changes that eventually might prove detrimental for the fish community as a whole.

The sailfin molly (Poecilia latipinna) was chosen as the test species because it is widespread and abundant on Merritt Island. Furthermore, because of its livebearing habit, it is relatively easy to collect detailed data on reproduction of this fish.

Populations of sailfin mollies in three contrasting habitats were sampled monthly from October, 1976 to December, 1978. Preserved females were autopsied, and details of their reproductive status were recorded. Various physical, chemical, and biological habitat parameters were measured monthly at each study station.

The major features of reproduction in the sailfin molly were similar in the three study populations. The reproductive season extended from April to October. Females become sexually mature at 22-24 mm standard length. The number of young in a brood was correlated positively with female size, and the sex ratio at birth was approximately 1:1.

Beyond these generalities, the details of reproductive output varied among the three populations studied, and also varied from month-to-month and between the two years of study. Overall reproductive output was measured by a replacement index. Replacement index was influenced by three major aspects of a population's reproductive strategy: (1) the percentage of adult females that were pregnant, (2) the size distribution of the pregnant females, and (3) the size-specific fecundity. Similar replacement index values could be achieved by different combinations of responses in these three measures of reproductive performance.

The three study populations exhibited similar monthly trends for replacement index in 1977. In general, all three sites exhibited spring or early summer peaks, mid-summer depressions, and late summer or fall peaks in reproductive output. In 1978, the general trends in replacement index were less consistent. At the BCHRD site, spring and fall reproductive peaks persisted. At the VABI and TOWY sites, replacement was rather modest and uniform throughout the 1978 season, without dramatic peaks.

The temporal and spatial variation in reproductive performance reported in this study can be explained in part by variations in important environmental conditions. Fluctuations in water temperature and/or habitat availability resulted in conditions for reproduction that varied from optimal to detrimental.

Laboratory experiments have shown that P. latipinna ceases to reproduce when water temperatures exceed 32°C. Surface water temperatures greater than 32 C were recorded regularly at the three study areas during summer months. This temperature factor may be partially responsible for the mid-summer depression in reproduction that was so conspicuous in 1977.

Rainfall in the Kennedy Space Center area usually is heavy from mid-summer through late fall, and minimal from late winter until early summer. As a consequence, the impounded waters on Merritt Island undergo drastic desiccation in spring and early summer, and the shallow, marsh-like habitats of the sailfin molly shrink dramatically. During this period the fish may be stressed due to crowding and competition for food. During late summer and fall, heavy rains cause water levels to rise, and mollies again are free to expand their habitat into newly flooded areas. Populations are less dense, and food availability is increased. However, during summer, the populations are exposed to very high water temperatures.

Spring peaks in reproduction, when evident, occurred during low water periods. However, spring water temperatures were optimal for reproduction, so the fish were not thermally stressed. The crowding of mollies into permanent waters in the spring might not adversely affect reproduction if the level of spring reproduction is controlled by overwinter environmental conditions, rather than by spring-time conditions (e.g., food availability).

The period of depressed reproduction in mid-summer occasionally coincided with low-water conditions as well as elevated temperatures. In most cases, however, a slump was evident even though water levels had begun to rise to "normal" levels. This suggests that even under conditions of expanded habitat availability, the fish could not always escape the limiting effects of high temperatures. The fall peak in reproduction typically was the most dramatic. It usually occurred in either September or October, when water levels were high and temperatures had begun to moderate.

Because of differences in basin configurations, the three study sites were not subject to the same degree of desiccation. In general, TOWY was the most stable study site. Its surface volume did not decrease dramatically as water levels fell, and there was a large, deep ditch system that constituted a more-than-adequate refugium during stressful periods. At VABI and BCHRD, especially the latter, low water conditions resulted in severe loss of habitat, and fishes were crowded into small pockets of permanent water.

These differences in the three sites are partly reflected in the pattern of reproduction. Dramatic peaks and valleys in replacement index were most conspicuous at BCHRD and VABI, the two most variable sites. At TOWY, more stable environmental conditions generally resulted in more stable reproductive performance throughout the season. These differences also were reflected in the comparison of 1977 and 1978 reproductive trends. Less rainfall in 1977 resulted in much more severe desiccation conditions than in 1978. At VABI, the less stressful conditions in 1978 resulted in much more uniform reproductive output than in 1977.

The ability to utilize reproductive performance of the sailfin molly to biomonitor environmental conditions is dependent upon the ability to differentiate between changes in reproduction caused by unnatural perturbations and those that are part of the natural response of the fish to varied ecological conditions. This study has shown that there is a vast amount of temporal and spatial variation in reproductive performance of the sailfin molly under "normal" conditions. Not only did each study population behave differently, there were dramatic differences between the two reproductive seasons. Furthermore, the observed patterns of variation may represent only a small part of the variability that could be exhibited under other environmental circumstances. Although the observed spatial and temporal variation is partly in accordance with a hypothesis involving water temperature and habitat conditions, there is no convenient way to test directly this idea. Furthermore, some of the observed variation is not easily explained in the context of this hypothesis.

As a result of these limitations, reproductive performance of the sailfin molly could be utilized in the context of environmental monitoring only in a very general way. It would be impossible to differentiate between natural and unnatural factors as the cause for site-to-site, month-to-month, or year-to-year variation in percent pregnancy, size of pregnant females, or size-specific fecundity.

Conclusions

(1) Reproductive output in the sailfin molly responds in a sensitive way to changes in environmental conditions.
(2) The three populations studied varied in reproductive performance in different ways, to different degrees, and at different times.
(3) At least some of the variability in reproductive performance seems to be related to varying environmental factors, especially water temperature and habitat availability. However, much variation in reproductive output is not explained by this hypothesis.
(4) Reproductive performance in the sailfin molly is not a suitable tool for evaluating sublethal changes in environmental quality. At the present level of understanding, it would be impossible to distinguish variations caused by natural environmental fluctuations and those induced by man-made perturbations.

Acknowledgments

I owe special thanks to the many students and technicians who have assisted in all facets of this project: Ken Bradley, Richard Byles, Tim Clabaugh, John Galluzzo, Helen Large, Larry Neebe, Jane Provancha, Bruce Stanley, Boyd Thompson, Jim Truner, Jeff Wetherington, and Sherry Williams. The data handling, management, and analysis was handled primarily by Jeff Wetherington, with assistance from Bruce Stanley and Philip Thompson. Jim Turner, Helen Large, Jane Provancha, and Jeff Wetherington examined the bulk of the 20,000 (+) mollies utilized in this investigation. Helen Large drew all the graphs and Don Schmitz assisted with art work. Rosalie Creamer served as secretary and Mary Ann Johnston served as administrative assistant for the project. Special thanks to Ralph Gunter and Drs. Leslie Ellis, David Vickers, and Jack Stout for helping with various administrative and contract problems. Dr. Vickers has been especially encouraging, and has granted special favors on more than one occasion.

Mr. Jack Salmela, Brevard Mosquito Control District, kept me advised of pumping activities, and discussed with me his substantial knowledge of Merritt Island natural history. The administration and staff of the Merritt Island National Wildlife Refuge have provided cooperation, logistic and material support and many additional favors during the course of this work. I acknowledge especially Robert Yoder, Stephen Vehrs, and Dr. James Baker. The Fish and Wildlife Service, Florida Game and Freshwater Fish Commission, and Florida Department of Natural Resources have granted the permits necessary to conduct this work.

Finally, I acknowledge financial support from NASA's John F. Kennedy Space Center for the support of this and earlier work on <u>P. latipinna</u> (Snelson, 1976). Drs. Paul Buchanan and William Knott and Mr. William Lee have acted as NASA's liaisons and have helped solve a variety of problems. Mr. Lee provided substantial encouragement by taking a special interest in the molly work.

Literature Cited

Amoroso, E. C. 1960. Viviparity in fishes. Symp. Zool. Soc. London 1:153:-181.

Bagenal, T. B. 1969. The relationship between food supply and fecundity in brown trout, Salmo trutta. J. Fish Biol. 1:167:182.

Baird, R. C. 1968. Aggressive behavior and social organization in Mollienesia latipinna (LeSueur). Texas J. Sci. 20:157-176.

Baird, R. C. 1974. Aspects of social behavior in Poecilia latipinna (LaSueur). Rev. Biol. Trop. 21:399-416.

Benoit, D. A. and G. W. Holcombe. 1978. Toxic Effects of zinc on fathead minnows (Pimephales promelas) in soft water. J. Fish Biol. 13:701-708.

Borowsky, R. L. 1973. Social control of adult size in males of Xiphophorus variatus. Nature 245:332-335.

Brungs, W. A. 1969. Chronic toxicity of zinc to the fathead minnow, Pimephales promelas Rafinesque. Trans. Amer. Fish. Soc. 98(2):272-279.

Cairns, J., Jr. and A. Scheier. 1964. The effect upon the pumpkinseed sunfish, Lepomis gibbosus (Linn.), of chronic exposure to lethal and sublethal concentrations of dieldrin. Not. Natur., Acad. Natur. Sci. Phila. No. 370:1-10.

Cummings, J. B. 1943. Morphogenesis of the gonopodium in Mollienisia latipinna. J. Morphology 73:1-17.

de Vlaming, V. L. 1972. Environmental control of teleost reproductive cycles: a brief review. J. Fish Biol. 4:131-140.

EPA. 1974. Methods for chemical analysis of water and wastes. EPA-625-/6-74-003. U.S. Environ. Protect. Agency, Off. Tech. Transfer, Wash , D.C., 298 pp.

Foster, N. R., J. Cairns, Jr., and R. L. Kaesler. 1969. The flagfish, Jordanella floridae, as a laboratory animal for behavioral bioassay studies. Proc. Acad. Natur. Sci. Philadelphia 121(5):129-152.

Foster, N. R., A. Scheier, and J. Cairns, Jr. 1966. Effects of ABS on feeding behavior of flagfish, Jordanella foridae. Trans. Amer. Fish. Soc. 95(1):109-110.

Grier, H. J. 1973. Reproduction in the teleost Poecilia latipinna, an ultrastructural and photoperiod investigation. Ph.D. Dissertation, Univ. South Fla., Tampa, 180 pp.

Harrington, R. W., Jr. and W. L. Bidlingmayer. 1958. Effects of dieldrin on fishes and invertebrates of a salt marsh. J. Wildlife Management 22(1):76-82.

Harrington, R. W., Jr. and E. S. Harrington. 1961. Food selection among fishes invading a high subtropical salt marsh: from onset of flooding through the progress of a mosquito brood. Ecology 42(4):646-666.

Hester, F. W. 1964. Effects of food supply on fecundity in the female guppy Lebistes reticulatus (Peters). J. Fish Res. Bd. Canada 21:757-764.

Hoese, H. D. and R. H. Moore. 1977. Fishes of the Gulf of Mexico. Texas A & M Univ. Press, College Station, Texas.

Hopper, A. F., Jr. 1943. The early embryology of Platypoecilus maculatus. Copeia 1943(4):218-224.

Hubbs, C. 1964. Interactions between a bisexual fish species and its gynogenetic sexual parasite. Bull. Texas Mem. Mus. 8:1-72.

Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region, rev. ed. Bull. Cranbrook Inst. Sci. No. 26, 213 pp.

Jalabert, B. and R. Billard. 1969. Etude ultrastructurale du site de conservation des spermatozoides dans l'ovaire de Poecilia reticulata (Poisson Teleosteen). Ann. Biol. Anim. Bioch. Biophys. 9(2):273-280.

Krumholz, L. A. 1948. Reproduction in the western mosquito fish, Gambusia affinis affinis (Baird & Girard), and its use in mosquito control. Ecol. Monogr. 18(1):1-43.

Lane, E. C. and R. J. Livingston. 1970. Some acute and chronic effects of dieldrin on the sailfin molly, Poecilia latipinna. Trans. Amer. Fish. Soc. 99(3):489-495.

Martin, R. C. 1975. Sexual and aggressive behavior, density and social structure in a natural population of mosquitofish, Gambusia affinis holbrooki. Copeia 1975:445-454.

Murray, R. W. 1971. Temperature Receptors, pp. 121-134. In W. S. Hoar and D. J. Randall (eds.), Fish Physiology, Vol. 5, Sensory Systems and Electric Organs. Academic Press, New York, N.Y.

Provost, M. W. 1959. Impounding salt marshes for mosquito control and its effects on bird life. Florida Natur. 32:163-170.

Provost, M. W. 1973. Salt marsh management in Florida. Ann. Proc., Conf. on Ecological Animal Control by Habitat Management, Vol. 5, not paginated.

Rosen, D. E. and R. M. Bailey. 1963. The poeciliid fishes (Cyprinodontiformes); their structure, zoogeography, and systematics. Bull. Amer. Mus. Natur. Hist. 126(1):1-176.

Rosen, D. E. and M. Gordon. 1953. Functional anatomy and evolution of male genitalia in poeciliid fishes. Zoologica 38:1-46.

Scrimshaw, N. S. 1944. Superfetation in poeciliid fishes. Copeia 1944(3):180-183.

Sheinbaum, Steven. 1979. Reproductive cycles, sex ratios, brood sizes and adult sizes of estuarine and freshwater populations of the sailfin molly Poecilia latipinna (LeSueur), in the Tampa Bay area. M.A. Thesis, Univ. Sout Fla., Tampa, 64 pp.

Simanek, D. E. 1978. Genetic variability and population structure of Poecilia latipinna. Nature 276:612-614.

Snelson, F. F., Jr. 1976. A study of a diverse coastal ecosystem on the Atlantic coast of Florida: Ichtyological Studies, Vols. I and II. Final Grant Report, Grant NGR-10-019-004. NASA, Kennedy Space Center, FL.; 19 Feb., 1976.

Snelson, F. F., Jr. 1977. Ichthyological Studies, pp. 245-349. In: D. H. Vickers, et al. Semi-Annual Report: A continuation of base-line studies for environmentally monitoring space transportation systems (STS) at John F. Kennedy Space Center. NASA Contract No. NAS10-8986; 11 January, 1977.

Snelson, F. F., Jr. and W. K. Bradley, Jr. 1978. Mortality of fishes due to cold on the east coast of Florida, January, 1977. Fla. Sci. 41(1):1-12.

Snelson, F. F., Jr. and J. D. Wetherington. 1980. Sex ratio in the sailfin molly, Poecilia latipinna. Evolution, in press.

Sohn, J. J. 1977. Socially induced inhibition of genetically determined maturation in platyfish, Xiphophorus maculatus. Science 195:199-201.

Stickel, L. F. 1973. Pesticide residues in birds and mammals, pp. 254-312 In: C. A. Edwards (ed.), Environmental pollution by pesticides. Plenum Press, New York, N.Y.

Strickland, J. D. H. and T. R. Parsons. 1972. A practical handbook of sea-water analysis. Fish. Res. Bd. Canada Bull. 167, 310 pp.

Tavolga, W. N. 1949. Embryonic development of the platyfish (Platypoecilus), the swordtail (Xiphophorus), and their hybrid. Bull. Amer. Mus. Natur. Hist. 94(4):165-229.

Tavolga, W. N. and R. Rugh. 1947. Development of the platyfish, Platypoecilus maculatus. Zoologica 32:1-15.

Thibault, R. E. and R. J. Schultz. 1978. Reproductive adaptations among viviparous fishes (Cyprinodontiformes: Poeciliidae). Evolution 32(2):320-333.

Turner, C. L. 1940. Superfetation in viviparous cyprinodont fishes. Copeia 1940(2):38-91.

Woonton, R. J. 1973. The effect of size of food ration on egg production in the female three-spined stickleback, Gasterosteus aculeatus L. J. Fish. Biol. 5:89-96.

Zar, J. H. 1974. Biostatistical analysis. Prentice-Hall, Inc., Englewood Cliffs, N.J., 620 pp.

APPENDIX TABLES

Table 1. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 19 October 1976; field number PLRS 76-6. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18–19	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
20–21	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)	-	-
22–23	53	53	(100)	0	(0)	0	(0)	53	(100)	0	(0)	-	-
24–25	39	39	(100)	0	(0)	0	(0)	39	(100)	0	(0)	-	-
26–27	20	18	(90)	0	(0)	0	(0)	18	(90)	2	(10)	4.5	0.7
28–29	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
30–31	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
32–33	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
34–35	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(12)	-
36–37	0	-		-		-		-		-		-	-
38–39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
TOTAL	155	152	(98)	0	(0)	0	(0)	152	(98)	3	(2)		

Table 2. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 1 November 1976, field number PLRS 76-10.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18-19	46	46	(100)	0	(0)	0	(0)	46	(100)	0	(0)	-	-
20-21	45	45	(100)	0	(0)	0	(0)	45	(100)	0	(0)	-	-
22-23	37	37	(100)	0	(0)	0	(0)	37	(100)	0	(0)	-	-
24-25	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
26-27	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
28-29	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
30-31	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
32-33	0	-		-		-		-		-		-	-
34-35	0	-		-		-		-		-		-	-
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
TOTAL	162	162	(100)	0	(0)	0	(0)	162	(100)	0	(0)		

Table 3. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 3 December 1976; field number PLRS-76-19.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18-19	47	47	(100)	0	(0)	0	(0)	47	(100)	0	(0)	-	-
20-21	54	54	(100)	0	(0)	0	(0)	54	(100)	0	(0)	-	-
22-23	27	27	(100)	0	(0)	0	(0)	27	(100)	0	(0)	-	-
24-25	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
26-27	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
28-29	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
30-31	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
32-33	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
Total	156	156	(100)	0	(0)	0	(0)	156	(100)	0	(0)		

Table 4. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 5 January 1977; field number PLRS-77-26.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpreg.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\overline{X}$	σ
18-19	45	45	(100)	0	(0)	0	(0)	45	(100)	0	(0)	-	-
20-21	45	45	(100)	0	(0)	0	(0)	45	(100)	0	(0)	-	-
22-23	28	28	(100)	0	(0)	0	(0)	28	(100)	0	(0)	-	-
24-25	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
26-27	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
28-29	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
30-31	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
34-35	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	155	155	(100)	0	(0)	0	(0)	155	(100)	0	(0)	-	-

Table 5. Summary of reproductive data for female _Poecilia latipinna_ from Station 1; collection date 3 February 1977; field number PLRS-77-38.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	σ
18-19	54	54	(100)	0	(0)	0	(0)	54	(100)	0	(0)	-	-
20-21	56	56	(100)	0	(0)	0	(0)	56	(100)	0	(0)	-	-
22-23	37	37	(100)	0	(0)	0	(0)	37	(100)	0	(0)	-	-
24-25	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)	-	-
26-27	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
28-29	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	160	160	(100)	0	(0)	0	(0)	160	(100)	0	(0)	-	-

Table 6. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 2 March 1977; field number PLRS-77-45.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Brood	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\overline{X}$	σ
18-19	48	48	(100)	0	(0)	0	(0)	48	(100)	0	(0)	-	-
20-21	43	41	(95)	2	(5)	0	(0)	43	(100)	0	(0)	-	-
22-23	28	23	(82)	5	(18)	0	(0)	28	(100)	0	(0)	-	-
24-25	13	10	(77)	3	(23)	0	(0)	13	(100)	0	(0)	-	-
26-27	10	7	(70)	3	(30)	0	(0)	10	(100)	0	(0)	-	-
28-29	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
30-31	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
34-35	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
36-37	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
38-39	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	149	136	(91)	13	(9)	0	(0)	149	(100)	0	(0)		

Table 7. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 29 March 1977; field number PLRS-77-50. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\overline{X}$	σ
18-19	38	36	(95)	2	(5)	0	(0)	38	(100)	0	(0)	-	-
20-21	36	18	(50)	18	(50)	0	(0)	36	(100)	0	(0)	-	-
22-23	39	10	(26)	26	(67)	3	(8)	39	(100)	0	(0)	-	-
24-25	27	5	(19)	19	(70)	3	(11)	27	(100)	0	(0)	-	-
26-27	12	0	(0)	7	(58)	3	(25)	10	(83)	2	(17)	8.50	6.36
28-29	4	0	(0)	0	(0)	2	(50)	2	(50)	2	(50)	19.00	0.0
30-31	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
32-33	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
34-35	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(20)	-
Total	158	69	(44)	73	(46)	11	(7)	153	(97)	5	(3)		

Table 8. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 9 May 1977; field number PLRS-77-57. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	13	11	(85)	2	(15)	0	(0)	13	(100)	0	(0)	-	-
20-21	35	20	(57)	14	(40)	0	(0)	34	(97)	1	(3)	(4)	-
22-23	45	6	(13)	30	(67)	8	(18)	44	(98)	1	(2)	(4)	-
24-25	31	3	(10)	6	(19)	4	(13)	13	(42)	18	(58)	3.67	1.08
26-27	12	1	(8)	2	(17)	1	(8)	4	(33)	8	(67)	4.88	1.64
28-29	9	0	(0)	1	(11)	0	(0)	1	(11)	8	(89)	6.25	1.67
30-31	2	0	(0)	1	(50)	0	(0)	1	(50)	1	(50)	(9)	-
32-33	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	148	41	(28)	57	(39)	13	(9)	111	(75)	[illegible]	(25)		

Table 9. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 9 June 1977; field number PLRS-77-73. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
20-21	[illegible]	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
22-23	[illegible]	17	(94)	1	(6)	0	(0)	18	(100)	0	(0)	-	-
24-25	12	9	(75)	3	(25)	0	(0)	12	(100)	0	(0)	-	-
26-27	9	1	(11)	4	(44)	0	(0)	5	(56)	4	(44)	7.00	1.83
28-29	25	0	(0)	2	(8)	1	(4)	3	(12)	22	(88)	9.83	4.70
30-31	29	0	(0)	1	(3)	4	(14)	5	(17)	24	(83)	15.42	7.10
32-33	16	0	(0)	0	(0)	0	(0)	0	(0)	16	(100)	21.63	8.29
34-35	15	1	(7)	0	(0)	0	(0)	1	(7)	14	(93)	20.71	9.08
36-37	10	0	(0)	0	(0)	1	(10)	1	(10)	9	(90)	26.70	9.51
38-39	4	0	(0)	0	(0)	0	(0)	0	(0)	4	(100)	26.50	16.31
Total	164	54	(33)	11	(7)	6	(4)	71	(43)	93	(57)		

Table 10. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 7 July 1977; field number PLRS-77-78. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
20-21	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)	-	-
22-23	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
24-25	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
26-27	25	23	(92)	2	(8)	0	(0)	25	(100)	0	(0)	-	-
28-29	21	9	(41)	10	(48)	2	(10)	21	(100)	0	(0)	-	-
30-31	33	4	(12)	24	(73)	4	(12)	32	(97)	1	(3)	(5)	-
32-33	21	0	(0)	16	(76)	3	(14)	19	(90)	2	(10)	(11.00)	0.00
34-35	8	0	(0)	3	(38)	3	(38)	6	(75)	2	(25)	9.50	0.71
36-37	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(14)	-
38-39	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	146	72	(49)	56	(38)	14	(8)	140	(96)	6	(4)		

Table 11. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 9 August 1977; field number PLRS-77-86. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
20-21	34	33	(97)	1	(3)	0	(0)	34	(100)	0	(0)	-	-
22-23	27	24	(89)	3	(11)	0	(0)	27	(100)	0	(0)	-	-
24-25	13	9	(69)	2	(15)	2	(15)	13	(100)	0	(0)	-	-
26-27	4	2	(50)	0	(0)	1	(25)	3	(75)	1	(25)	(5)	-
28-29	8	1	(13)	2	(25)	0	(0)	3	(38)	5	(63)	9.00	3.54
30-31	9	0	(0)	3	(33)	0	(0)	3	(33)	6	(67)	13.00	1.41
32-33	15	0	(0)	4	(27)	5	(33)	9	(60)	6	(40)	11.67	2.34
34-35	23	0	(0)	7	(30)	9	(39)	16	(70)	7	(30)	12.86	2.54
36-37	7	0	(0)	4	(57)	0	(0)	4	(57)	3	(43)	12.00	3.46
Total	152	81	(53)	26	(17)	17	(11)	124	(82)	28	(18)		

Table 12. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 7 September 1977; field number PLRS-77-92. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	19	16	(84)	2	(11)	0	(0)	18	(95)	1	(5)	(4)	-
20-21	27	11	(41)	11	(41)	5	(19)	27	(100)	0	(0)	-	-
22-23	26	5	(19)	13	(50)	5	(19)	23	(88)	3	(12)	8.00	6.08
24-25	21	0	(0)	8	(38)	5	(24)	13	(62)	8	(38)	5.75	2.71
26-27	13	1	(8)	4	(31)	5	(38)	10	(77)	3	(23)	10.66	9.82
28-29	10	0	(0)	7	(70)	2	(20)	9	(90)	1	(10)	(10)	-
30-31	11	0	(0)	5	(45)	2	(18)	7	(64)	4	(36)	14.25	2.06
32-33	12	0	(0)	4	(33)	4	(33)	8	(67)	4	(33)	16.75	5.62
34-35	13	0	(0)		(62)	1	(8)	9	(69)	4	(31)	23.50	6.03
36-37	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	21.00	2.83
Total	154	33	(21)	62	(40)	29	(19)	124	(81)	30	(19)		

Table 13. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 8 October 1977; field number PLRS-77-106. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
20-21	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)	-	-
22-23	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
24-25	9	8	(89)	0	(0)	0	(0)	8	(89)	1	(11)	(7)	-
26-27	11	8	(73)	0	(0)	0	(0)	8	(73)	3	(27)	11.00	6.24
28-29	18	10	(56)	0	(0)	1	(6)	11	(61)	7	(39)	12.00	1.41
30-31	8	1	(13)	1	(13)	2	(25)	4	(50)	4	(50)	13.75	3.59
32-33	15	2	(13)	1	(7)	1	(7)	4	(27)	11	(73)	22.64	7.16
34-35	12	2	(17)	0	(0)	1	(8)	3	(25)	9	(75)	21.56	7.84
36-37	12	0	(0)	0	(0)	3	(25)	3	(25)	9	(75)	29.78	6.94
38-39	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(45)	-
Total	113	58	(51)	2	(2)	8	(7)	68	(60)	45	(40)		

Table 14. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 5 November 1977; field number PLRS-77-109. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)		
20-21	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)		
22-23	47	47	(100)	0	(0)	0	(0)	47	(100)	0	(0)		
24-25	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)		
26-27	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)		
28-29	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
30-31	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)		
32-33	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
34-35	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
Total	149	149	(100)	0	(0)	0	(0)	149	(100)	0	(0)		

Table 15. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 1; collection date 4 December 1977; field number PLRS-77-117. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	43	43	(100)	0	(0)	0	(0)	43	(100)	0	(0)		
20-21	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)		
22-23	34	34	(100)	0	(0)	0	(0)	34	(100)	0	(0)		
24-25	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)		
26-27	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
28-29	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)		
30-31	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
32-33	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
34-35	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
36-37	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
38-39	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	152	152	(100)	0	(0)	0	(0)	152	(100)	0	(0)		

Table 16. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 7 January 1978; field number PLRS-78-122. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)		
20-21	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)		
22-23	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)		
24-25	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)		
26-27	22	22	(100)	0	(0)	0	(0)	22	(100)	0	(0)		
28-29	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)		
30-31	29	29	(100)	0	(C)	0	(0)	29	(100)	0	(0)		
32-33	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)		
34-35	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
36-37	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)		
38-39	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	175	175	(100)	0	(0)	0	(0)	175	(100)	0	(0)		

Table 17. Summary of reproductive data for female _Poecilia latipinna_ from Station 1; collection date 3 February 1978; field number PLRS-78-126. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
20-21	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)		
22-23	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)		
24-25	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)		
26-27	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)		
28-29	35	34	(97)	1	(3)	0	(0)	35	(100)	0	(0)		
30-31	33	31	(94)	2	(6)	0	(0)	33	(100)	0	(0)		
32-33	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)		
34-35	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
36-37	3	2	(67)	1	(33)	0	(0)	3	(100)	0	(0)		
38-39	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
Total	156	152	(97)	4	(3)	0	(0)	156	(100)	0	(0)		

Table 18. Summary of reproductive data for female _Poecilia latipinna_ from Station 1; collection date 6 March 1978; field number PLRS-78-132. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
20-21	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
22-23	18	17	(94)	1	(6)	0	(0)	18	(100)	0	(0)		
24-25	33	33	(100)	0	(0)	0	(0)	33	(100)	0	(0)		
26-27	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)		
28-29	25	21	(84)	4	(16)	0	(0)	25	(100)	0	(0)		
30-31	21	18	(86)	3	(14)	0	(0)	21	(100)	0	(0)		
32-33	11	9	(82)	2	(18)	0	(0)	11	(100)	0	(0)		
34-35	8	6	(75)	2	(25)	0	(0)	8	(100)	0	(0)		
36-37	5	4	(80)	1	(20)	0	(0)	5	(100)	0	(0)		
38-39	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
Total	160	147	(92)	13	(8)	0	(0)	160	(100)	0	(0)		

Table 19. Summary of reproductive data for female Poecilia latipin . from Station 1; collection date 6 April, 1978; field number PLRS-78-137. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	25	25	(100)	0	(0)	0	(0)	25	(100)	0	(0)	-	-
20-21	18	18	(100)	0	(0)	0	(0)	18	(100)	0	(0)	-	-
22-23	23	20	(87)	3	(13)	0	(0)	23	(100)	0	(0)	-	-
24-25	26	11	(42)	12	(46)	2	(8)	25	(96)	1	(4)	(7)	-
26-27	24	2	(8)	13	(54)	6	(25)	21	(88)	3	(12)	9.00	1.00
28-29	15	0	(0)	5	(33)	1	(7)	6	(40)	9	(60)	11.89	2.80
30-31	6	0	(0)	0	(0)	1	(17)	1	(17)	5	(83)	14.00	3.16
32-33	5	0	(0)	0	(0)	0	(0)	0	(0)	5	(100)	14.60	7.20
34-35	5	0	(0)	0	(0)	0	(0)	0	(0)	5	(100)	17.00	2.35
36-27	4	0	(0)	0	(0)	0	(0)	0	(0)	4	(100)	22.50	7.55
38-39	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(21)	
Total	152	76	(50)	33	(22)	10	(7)	119	(78)	33	(22)		

Table 20 Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 12 May 1978; field number PLRS-78-144. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
20-21	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
22-23	21	11	(52)	8	(38)	1	(5)	20	(95)	1	(5)	(5)	-
24-25	49	10	(20)	32	(65)	2	(4)	44	(90)	5	(10)	5.60	0.89
26-27	38	5	(13)	19	(50)	4	(11)	28	(74)	10	(26)	6.60	1.51
28-29	24	4	(17)	13	(54)	1	(4)	18	(75)	6	(25)	7.50	0.84
30-31	8	0	(0)	7	(88)	0	(0)	7	(88)	1	(12)	(8)	-
32-33	8	1	(13)	6	(75)	0	(0)	7	(88)	1	(12)	(6)	-
34-35	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(10)	-
36-37	2	1	(50)	1	(50)	0	(0)	2	(100)	0	(0)	-	-
Total	153	34	(22)	86	(56)	8	(5)	128	(84)	25	(16)		

Table 21. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 14 June 1978; field number PLRS-78-148. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)	-	-
20-21	4	3	(75)	1	(25)	0	(0)	4	(100)	0	(0)	-	-
22-23	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
24-25	19	0	(0)	11	(58)	6	(32)	17	(89)	2	(11)	14.50	14.85
26-27	47	0	(0)	29	(62)	9	(19)	38	(81)	9	(19)	7.78	5.61
28-29	39	0	(0)	25	(64)	3	(8)	28	(72)	11	(28)	14.00	10.19
30-31	13	0	(0)	4	(31)	8	(62)	12	(92)	1	(8)	(7)	-
32-33	7	0	(0)	3	(43)	1	(14)	4	(57)	3	(43)	28.67	10.97
34-35	2	0	(0)	1	(50)	0	(0)	1	(50)	1	(50)	(42)	-
36-37	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
38-39	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(47)	-
40-41	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	143	13	(9)	75	(52)	27	(19)	115	(80)	28	(20)		

Table 22. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 10 July 1978; field number PLRS-78-154. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
20-21	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)	-	-
22-23	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
24-25	22	4	(18)	8	(36)	0	(0)	12	(55)	10	(45)	5.90	1.79
26-27	44	13	(30)	17	(39)	0	(0)	30	(68)	14	(32)	7.64	1.45
28-29	49	6	(12)	16	(33)	0	(0)	22	(45)	27	(55)	8.44	1.95
30-31	10	0	(0)	5	(50)	0	(0)	5	(50)	5	(50)	11.00	2.55
32-33	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(13)	-
34-35	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
36-37	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
	156	53	(34)	46	(29)	0	(0)	99	(63)	57	(37)		

Table 23. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 1; collection date 7 August, 1978; field number PLRS-78-156. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
20-21	5	4	(80)	1	(20)	0	(0)	5	(100)	0	(0)	-	-
22-23	10	7	(70)	3	(30)	0	(0)	10	(100)	0	(0)	-	-
24-25	3	0	(0)	3	(100)	0	(0)	3	(100)	0	(0)	-	-
26-27	22	0	(0)	5	(23)	6	(27)	11	(50)	11	(50)	6.45	3.39
28-29	58	1	(2)	12	(21)	15	(26)	28	(48)	30	(52)	6.50	2.26
30-31	37	0	(0)	3	(8)	14	(38)	17	(46)	20	(54)	8.20	2.59
32-33	14	0	(0)	0	(0)	4	(29)	4	(29)	10	(71)	9.70	2.06
34-35	11	0	(0)	3	(27)	1	(9)	4	(36)	7	(64)	10.43	2.51
36-37	4	0	(0)	1	(25)	0	(0)	1	(25)	3	(75)	11.00	1.00
38-39	1	0	(0)	0	(0)	1	(100)	1	(100)	0	(0)	-	-
Total	167	14	(8)	31	(19)	41	(25)	86	(51)	81	(49)		

Table 24. Summary of reproductive data for female Poecilia latipinna from Station 1; collection date 5 September, 1978; field number PLRS-78-160. Values in parentheses in the column labeled mean number of embr''os per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	18	18	(100)	0	(0)	0	(0)	18	(100)	0	(0)	-	-
20-21	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(^)	-	-
22-23	4	3	(75)	0	(0)	0	(0)	3	(75)	1	(25)	(5)	-
24-25	6	0	(0)	5	(83)	0	(0)	5	(83)	1	(17)	(3)	-
26-27	14	2	(14)	4	(29)	0	(0)	6	(43)	8	(57)	7.75	1.83
28-29	29	1	(3)	9	(31)	2	(7)	12	(41)	17	(59)	8.12	2.69
30-31	37	1	(3)	13	(35)	1	(3)	15	(41)	22	(59)	10.05	3.08
32-33	21	0	(0)	6	(29)	1	(5)	7	(33)	14	(67)	10.93	2.59
34-35	10	0	(0)	1	(10)	0	(0)	1	(10)	9	(90)	13.89	3.52
36-37	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(15)	-
38-39	3	1	(33)	0	(0)	0	(0)	1	(33)	2	(67)	14.50	3.54
Total	152	35	(23)	38	(25)	4	(3)	77	(51)	75	(49)		

Table 25. Summary of reproductive data for female *Poecilia latipinna* from Station 1; collection date 3 October, 1978; field number FLRS-78-164. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
20-21	14	13	(93)	0	(0)	0	(0)	13	(93)	1	(7)	(2)	-
22-23	14	12	(86)	1	(7)	0	(0)	13	(93)	1	(7)	(4)	-
24-25	15	13	(87)	1	(7)	0	(0)	14	(93)	1	(7)	(6)	-
26-27	39	28	(72)	3	(8)	0	(0)	31	(79)	8	(21)	4.25	1.58
28-29	36	26	(72)	3	(8)	1	(3)	30	(83)	6	(17)	5.00	1.41
30-31	28	15	(54)	4	(14)	1	(4)	20	(71)	8	(29)	7.00	2.07
32-33	8	5	(63)	2	(25)	0	(0)	7	(88)	1	(12)	(5)	-
34-35	7	5	(71)	1	(14)	0	(0)	6	(86)	1	(14)	(9)	-
36-37	2	1	(50)	0	(0)	0	(0)	1	(50)	1	(50)	(13)	-
Total	171	126	(74)	15	(9)	2	(1)	143	(84)	28	(16)		

Table 26. Summary of reproductive data for female <u>Poecilia Latipinna</u> from Station 1; collection date 09 November 1978; field number PLRS-78-168. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
22-23	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
24-25	18	18	(100)	0	(0)	0	(0)	18	(100)	0	(0)	-	-
26-27	19	18	(95)	0	(0)	0	(0)	18	(95)	1	(5)	(1)	-
28-29	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)	-	-
30-31	31	31	(100)	0	(0)	0	(0)	31	(100)	0	(0)	-	-
32-33	29	26	(90)	0	(0)	0	(0)	26	(90)	3	(10)	6.7	4.73
34-35	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)	-	-
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
38-39	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
42-43	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	153	149	(97)	0	(0)	0	(0)	149	(97)	4	(3)		

Table 27. Summary of reproductive data for female *Poecilia Latipinna* from Station 1; collection date 05 December 1978; field number PLRS-78-172. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods X	s
18-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
22-23	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
24-25	15	15	(100)	0	(0)	0	(0)	15	(100)	0	(0)	-	-
26-27	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
28-29	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)	-	-
30-31	44	44	(100)	0	(0)	0	(0)	44	(100)	0	(0)	-	-
32-33	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
34-35	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
36-37	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
38-39	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
TOTAL	154	154	(100)	0	(0)	0	(0)	154	(100)	0	(0)		

Table 28. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 2; collection date 19 October 1976; field number PLRS-76-5. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18-19	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
20-21	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)	-	-
22-23	34	33	(97)	1	(3)	0	(0)	34	(100)	0	(0)	-	-
24-25	35	35	(100)	0	(0)	0	(0)	35	(100)	0	(0)	-	-
26-27	35	32	(91)	2	(6)	0	(0)	34	(97)	1	(3)	(3)	-
28-29	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
30-31	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
32-33	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
34-35	6	5	(83)	0	(0)	0	(0)	5	(83)	1	(17)	(7)	-
36-37	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
TOTAL	160	155	(97)	3	[illegible]	0	(0)	158	(99)	2	(1)		

Table 29. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 1 November 1976; field number P[illegible] 76-9.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18-19	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
20-21	29	29	(100)	0	(0)	0	(0)	29	(100)	0	(0)	-	-
22-23	30	30	(100)	0	(0)	0	(0)	30	(100)	0	(0)	-	-
24-25	25	25	(100)	0	(0)	0	(0)	25	(100)	0	(0)	-	-
26-27	31	31	(100)	0	(0)	0	(0)	31	(100)	0	(0)	-	-
28-29	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
30-31	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
32-33	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
34-35	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
36-37	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
38-39	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
TOTAL	163	163	(100)	0	(0)	0	(0)	163	(100)	0	(0)		

Table 30. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 3 December 1976; field number PLRS-77-18.

Size Group mm SL	N	Undevel. Ovaries N	Undevel. Ovaries (%)	Developing Ova N	Developing Ova (%)	Mature Ova N	Mature Ova (%)	Total Nonpregn. N	Total Nonpregn. (%)	Pregnant N	Pregnant (%)	Embryos/Broods $\bar{X}$	Embryos/Broods σ
18-19	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)	-	-
20-21	32	32	(100)	0	(0)	0	(0)	32	(100)	0	(0)	-	-
22-23	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)	-	-
24-25	30	30	(100)	0	(0)	0	(0)	30	(100)	0	(0)	-	-
26-27	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)	-	-
28-29	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
30-31	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
34-35	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
Total	146	146	(100)	0	(0)	0	(0)	146	(100)	0	(0)		

Table 31. Summary of reproductive data for female Poecilia latipinna from Station 2; collection date 4 January 1977; field number PL-S-77-24.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\overline{X}$	σ
18-19	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)	-	-
20-21	47	47	(100)	0	(0)	0	(0)	47	(100)	0	(0)	-	-
22-23	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)	-	-
24-25	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)	-	-
26-27	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
28-29	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)	-	-
30-31	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
34-35	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	157	157	(100)	0	(0)	0	(0)	157	(100)	0	(0)		

Table 32. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 3 February 1977; field number PLRS-77-39.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	σ
18-19	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
20-21	34	34	(100)	0	(0)	0	(0)	34	(100)	0	(0)	-	-
22-23	43	43	(100)	0	(0)	0	(0)	43	(100)	0	(0)	-	-
24-25	36	36	(100)	0	(0)	0	(0)	36	(100)	0	(0)	-	-
26-27	25	24	(96)	1	(4)	0	(0)	25	(100)	0	(0)	-	-
28-29	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)	-	-
30-31	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
34-35	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
36-37	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
Total	179	178	(99)	1	(1)	0	(0)	179	(100)	0	(0)		

Table 33. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 2 March 1977; field number PLRS-77-44.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\overline{X}$	σ
18-19	81	79	(98)	2	(2)	0	(0)	81	(100)	0	(0)	-	-
20-21	40	33	(82)	7	(18)	0	(0)	40	(100)	0	(0)	-	-
22-23	31	23	(74)	8	(26)	0	(0)	31	(100)	0	(0)	-	-
24-25	20	15	(75)	5	(25)	0	(0)	20	(100)	0	(0)	-	-
26-27	13	7	(54)	6	(46)	0	(0)	13	(100)	0	(0)	-	-
28-29	8	3	(38)	5	(62)	0	(0)	8	(100)	0	(0)	-	-
30-31	2	1	(50)	1	(50)	0	(0)	2	(100)	0	(0)	-	-
Total	195	161	(83)	34	(17)	0	(0)	195	(100)	0	(0)		

Table 34. Summary of reproductive data for female Poecilia latipinna from Station 2; collection date 29 March 1977; field number PLRS-77-51. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\overline{X}$	σ
18-19	18	16	(89)	2	(11)	0	(0)	18	(100)	0	(0)	-	-
20-21	17	12	(71)	5	(29)	0	(0)	17	(100)	0	(0)	-	-
22-23	22	6	(27)	15	(68)	1	(5)	22	(100)	0	(0)	-	-
24-25	19	5	(26)	10	(53)	4	(21)	19	(100)	0	(0)	-	-
26-27	29	3	(10)	16	(55)	6	(21)	25	(86)	4	(14)	7.00	2.31
28-29	17	1	(6)	3	(18)	8	(47)	12	(71)	5	(29)	11.40	3.51
30-31	18	0	(0)	1	(6)	9	(50)	10	(56)	8	(44)	10.00	2.62
32-33	15	0	(0)	3	(20)	2	(13)	5	(33)	10	(67)	10.80	3.22
34-35	2	0	(0)	2	(100)	0	(0)	2	(100)	0	(0)	-	-
36-37	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(14)	-
Total	158	43	(27)	57	(36)	30	(19)	130	(82)	28	(18)		

Table 35. Summary of reproductive data for female Poecilia latipinna from Station 2; collection date 9 May 1977; field number PLRS-77-56. Values in parenthesis in the column labeled number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
20-21	5	3	(60)	2	[illegible]	0	(0)	5	(100)	0	(0)	-	-
22-23	20	3	(15)	13	(65)	3	(15)	19	(95)	1	(5)	(5)	-
24-25	35	0	(0)	16	(46)	4	(11)	20	(57)	15	(43)	5.73	1.53
26-27	50	0	(0)	8	(16)	8	(16)	16	(32)	34	(68)	5.85	1.76
28-29	32	0	(0)	12	(38)	1	(3)	13	(41)	19	(59)	6.10	1.91
30-31	18	0	(0)	7	(39)	0	(0)	7	(39)	11	(61)	11.27	3.23
32-33	18	0	(0)	2	(11)	1	(6)	3	(17)	15	(83)	13.33	3.81
34-35	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
36-37	2	0	(0)	0	(0)	1	(50)	1	(50)	1	(50)	(11)	-
Total	180	6	(3)	60	(33)	18	(10)	84	(47)	96	(53)		

Table 36. Summary of reproductive data for female Poecilia latipinna from Station 2; collection date 9 June 1977: field number PLRS-77-74. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
20-21	45	45	(100)	0	(0)	0	(0)	45	(100)	0	(0)	-	-
22-23	45	[illegible]	(87)	5	(13)	0	(0)	45	(100)	0	(0)	-	-
24-25	28	17	(61)	11	(39)	0	(0)	28	(100)	0	(0)	-	-
26-27	9	8	(89)	1	(11)	0	(0)	9	(100)	0	(0)	-	-
28-29	11	0	(0)	6	(55)	0	(0)	6	(55)	5	(45)	11.00	3.81
30-31	4	0	(0)	2	(50)	1	(25)	3	(75)	1	(25)	(12)	-
32-33	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	12.00	2.83
34-35	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
36-37	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	155	119	(77)	27	(17)	1	(1)	147	(95)	9	(5)		

Table 37. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 7 July 1977; field number PLRS-77-79. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	22	22	(100)	0	(0)	0	(0)	22	(100)	0	(0)	-	-
20-21	32	32	(100)	0	(0)	0	(0)	32	(1[illegible])	0	(0)	-	-
22-23	33	32	(97)	1	(3)	0	(0)	33	(100)	0	(0)	-	-
24-25	16	15	(94)	1	(6)	0	(0)	16	(100)	0	(0)		-
26-27	11	9	(82)	1	(9)	1	(9)	11	(100)	0	(0)	-	-
28-29	18	5	(28)	9	(50)	4	(22)	18	(100)	0	(0)	-	-
30-31	14	0	(0)	6	(43)	4	(29)	10	(71)	4	(29)	10.7[illegible]	3.86
32-33	3	0	(0)	0	(0)	1	(33)	1	(33)	2	(67)	11.50	2.12
34-35	7	1	(14)	1	(14)	2	(29)	4	(57)	3	(43)	16.33	4.16
36-37	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
38-39	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(18)	-
Total	157	116	(74)	19	(12)	12	(8)	147	(94)	10	(6)		

Table 38. Summary of reproductive data for female _Poecilia latipinna_ from Station 2; collection date 9 August 1977; field number PLRS-77-84. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods X̄	s
18-19	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
20-21	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
22-23	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)	-	-
24-25	21	12	(57)	6	(29)	1	(5)	19	(90)	2	(10)	6.50	2.12
26-27	24	7	(29)	7	(29)	2	(8)	16	(67)	8	(33)	7.88	1.64
28-29	28	3	(11)	9	(32)	1	(4)	13	(46)	15	(54)	7.40	1.84
30-31	17	4	(24)	3	(18)	1	(6)	8	(47)	9	(53)	10.33	2.50
32-33	13	3	(23)	2	(15)	0	(0)	5	(38)	8	(62)	10.25	3.20
34-35	9	1	(11)	1	(11)	1	(11)	3	(33)	6	(67)	15.00	3.22
36-37	5	0	(0)	0	(0)	0	(0)	0	(0)	5	(100)	16.80	6.46
38-39	4	0	(0)	0	(0)	1	(25)	1	(25)	3	(75)	14.33	6.51
40-41	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(11)	-
Total	160	68	(43)	28	(18)	7	(4)	103	(64)	57	(36)		

Table 39. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 6 September 1977; field number PLRS-77-91. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	15	14	(93)	0	(0)	1	(7)	15	(100)	0	(0)	-	-
20-21	40	36	(90)	1	(3)	0	(0)	37	(93)	3	(8)	3.33	1.15
22-23	64	38	(59)	6	(9)	5	(8)	49	(77)	15	(23)	3.80	1.61
24-25	31	11	(35)	2	(6)	5	(16)	18	(58)	13	(42)	5.23	1.24
26-27	21	5	(24)	1	(5)	2	(10)	8	(38)	13	(62)	6.46	2.70
28-29	7	2	(29)	0	(0)	2	(29)	4	(57)	3	(43)	9.67	5.03
30-31	5	2	(40)	0	(0)	0	(0)	2	(40)	3	(60)	8.33	1.15
32-33	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	13.50	2.12
34-35	5	0	(0)	2	(40)	0	(0)	2	(40)	3	(60)	11.67	4.16
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	193	111	(58)	12	(6)	15	(8)	138	(72)	55	(28)		

Table 40. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 2; collection date 8 October 1977; field number PLRS-77-107. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
20-21	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
22-23	33	32	(97)	0	(0)	0	(0)	32	(97)	1	(3)	(2)	-
24-25	30	26	(87)	0	(0)	0	(0)	26	(87)	4	(13)	3.25	0.96
26-27	17	14	(82)	1	(6)	0	(0)	15	(88)	2	(12)	3.00	0.00
28-29	9	7	(78)	0	(0)	0	(0)	7	(78)	2	(22)	3.50	0.71
30-31	9	5	(56)	0	(0)	0	(0)	5	(56)	4	(44)	8.00	3.16
32-33	13	7	(54)	0	(0)	0	(0)	7	(54)	6	(46)	7.17	3.43
34-35	5	3	(60)	0	(0)	0	(0)	3	(60)	2	(40)	10.00	0.00
36-37	2	1	(50)	0	(0)	0	(0)	1	(50)	1	(50)	(6)	-
38-39	2	1	(50)	0	(0)	0	(0)	1	(50)	1	(50)	(8)	-
Total	156	132	(85)	1	(1)	0	(0)	133	(85)	23	(15)		

Table 41. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 2; collection date 5 November 1977; field number PLRS-77-110. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)		
20-21	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)		
22-23	41	41	(100)	0	(0)	0	(0)	41	(100)	0	(0)		
24-25	25	25	(100)	0	(0)	0	(0)	25	(100)	0	(0)		
26-27	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
28-29	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)		
30-31	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)		
32-33	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)		
34-35	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
36-37	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	146	146	(100)	0	(0)	0	(0)	146	(100)	0	(0)		

Table 42. **Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 4 December 1977; field number PLRS-77-115. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.**

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
20-21	36	36	(100)	0	(0)	0	(0)	36	(100)	0	(0)		
22-23	57	57	(100)	0	(0)	0	(0)	57	(100)	0	(0)		
24-25	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)		
26-27	19	18	(95)	1	(5)	0	(0)	19	(100)	0	(0)		
28-29	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)		
30-31	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
34-35	3	2	(67)	0	(0)	1	(33)	3	(100)	0	(0)		
Total	156	154	(99)	1	(1)	1	(1)	156	(100)	0	(0)		

Table 43. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 7 January 1978; field number PLRS-78-124. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observation.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	22	22	(100)	0	(0)	0	(0)	22	(100)	0	(0)		
20-21	49	49	(100)	0	(0)	0	(0)	49	(100)	0	(0)		
22-23	32	32	(100)	0	(0)	0	(0)	32	(100)	0	(0)		
24-25	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)		
26-27	14	13	(93)	1	(7)	0	(0)	14	(100)	0	(0)		
28-29	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)		
30-31	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
32-33	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
34-35	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
36-37	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	154	153	(99)	1	(1)	0	(0)	154	(100)	0	(0)		

Table 44. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 3 February 1978; field number PLRS-78-127. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	Undevel. Ovaries (%)	Developing Ova N	Developing Ova (%)	Mature Ova N	Mature Ova (%)	Total Nonpregn. N	Total Nonpregn. (%)	Pregnant N	Pregnant (%)	Normal Embryos/Broods $\bar{X}$	Normal Embryos/Broods s
18-19	28	28	(100)	0	(0)	0	(0)	28	(100)	0	(0)		
20-21	43	43	(100)	0	(0)	0	(0)	43	(100)	0	(0)		
22-23	32	32	(100)	0	(0)	0	(0)	32	(100)	0	(0)		
24-25	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)		
26-27	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
28-29	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
30-31	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
32-33	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
Total	135	135	(100)	0	(0)	0	(0)	135	(100)	0	(0)		

Table 45. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 6 March 1978; field number PLRS-78-133. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
20-21	39	38	(97)	1	(3)	0	(0)	39	(100)	0	(0)		
22-23	38	33	(87)	5	(13)	0	(0)	38	(100)	0	(0)		
24-25	33	28	(85)	5	(15)	0	(0)	33	(100)	0	(0)		
26-27	17	13	(76)	4	(24)	0	(0)	17	(100)	0	(0)		
28-29	7	5	(71)	2	(29)	0	(0)	7	(100)	0	(0)		
30-31	6	2	(33)	4	(67)	0	(0)	6	(100)	0	(0)		
32-33	3	2	(67)	1	(33)	0	(0)	3	(100)	0	(0)		
34-35	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)		
36-37	0	0	(0)	0	(0)	0	(0)	0	(100)	0	(0)		
38-39	0	0	(0)	0	(0)	0	(0)	0	(100)	0	(0)		
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	147	124	(84)	23	(16)	0	(0)	147	(100)	0	(0)		

Table 46. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 6 April 1978; field number PLRS-78-139. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	7	6	(86)	1	(14)	0	(0)	7	(100)	0	(0)	-	-
20-21	14	8	(57)	6	(43)	0	(0)	14	(100)	0	(0)	-	-
22-23	14	1	(7)	13	(93)	0	(0)	14	(100)	0	(0)	-	-
24-25	24	0	(0)	22	(92)	2	(8)	24	(100)	0	(0)	-	-
26-27	28	0	(0)	17	(61)	8	(29)	25	(89)	3	(11)	9.00	1.00
28-29	33	1	(3)	21	(64)	5	(15)	27	(82)	6	(18)	12.00	3.03
30-31	16	1	(6)	9	(56)	1	(6)	11	(69)	5	(31)	13.80	2.28
32-33	9	0	(0)	3	(33)	1	(11)	4	(44)	5	(56)	15.00	2.65
34-34	4	0	(0)	1	(25)	1	(25)	2	(50)	2	(50)	26.00	9.90
36-37	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	23.00	1.41
38-39	5	0	(0)	1	(20)	0	(0)	1	(20)	4	(80)	30.00	8.45
40-41	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	157	17	(11)	95	(61)	18	(11)	130	(83)	27	(17)		

Table 47. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 12 May 1978; field number PLRS-78-145. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
20-21	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
22-23	3	0	(0)	2	(67)	0	(0)	2	(67)	1	(33)	(3)	-
24-25	9	0	(0)	3	(33)	1	(11)	4	(44)	5	(56)	5.60	2.30
26-27	19	0	(0)	12	(63)	2	(11)	14	(74)	5	(26)	6.80	1.30
28-29	20	0	(0)	9	(45)	4	(20)	13	(65)	7	(35)	7.43	2.57
30-31	30	0	(0)	15	(50)	3	(10)	18	(60)	12	(40)	8.33	1.83
32-33	32	0	(0)	14	(44)	0	(0)	14	(44)	18	(56)	9.28	2.11
34-35	23	1	(4)	4	(17)	2	(9)	7	(30)	16	(70)	11.12	4.70
36-37	15	0	(0)	3	(20)	1	(7)	4	(27)	11	(73)	14.91	3.81
38-39	6	0	(0)	1	(17)	0	(0)	1	(17)	5	(83)	13.80	1.30
40-41	3	0	(0)	1	(33)	0	(0)	1	(33)	2	(67)	25.50	6.36
42-43	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(22)	-
44-45	2	0	(0)	0	(0)	1	(50)	1	(50)	1	(50)	(23)	-
46-47	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(24)	-
Total	164	1	(1)	64	(39)	14	(9)	79	(48)	85	(52)		

Table 48. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 2; collection date 14 June 1978; field number PLRS-78-147. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
20-21	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
22-23	2	1	(50)	1	(50)	0	(0)	2	(100)	0	(0)	-	-
24-25	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
26-27	10	2	(20)	2	(20)	2	(20)	6	(60)	4	(40)	7.25	2.87
28-29	33	2	(6)	9	(27)	9	(27)	20	(61)	13	(39)	7.92	2.43
30-31	46	0	(0)	8	(17)	7	(15)	15	(33)	31	(67)	8.71	3.05
32-33	26	0	(0)	1	(4)	5	(19)	6	(23)	20	(77)	10.70	4.40
34-35	19	0	(0)	2	(11)	4	(21)	6	(32)	13	(68)	12.54	3.67
36-37	8	1	(12)	2	(25)	1	(12)	4	(50)	4	(50)	14.00	3.83
38-39	3	0	(0)	0	(0)	0	(0)	0	(0)	3	(100)	17.00	1.00
40-41	2	0	(0)	0	(0)	1	(50)	1	(50)	1	(50)	(16)	-
Total	156	13	(8)	25	(16)	29	(19)	67	(43)	89	(57)		

Table 49. Summary of reproductive data for female Poecilia latipinna from Station 2; collection date 10 July 1978; field number PLRS-78-152. lues in parentheses in the column labeled mean number of embryos per brood are not mean. are single observations.

Size Group mm. SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
22-23	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
24-25	4	2	(50)	2	(50)	0	(0)	4	(100)	0	(0)	-	-
26-27	3	2	(67)	1	(33)	0	(0)	3	(100)	0	(0)	-	-
28-29	7	0	(0)	6	(86)	0	(0)	6	(86)	1	(14)	(6)	-
30-31	28	1	(4)	17	(61)	5	(18)	23	(82)	5	(18)	6.80	1.10
32-33	33	3	(9)	22	(67)	5	(15)	30	(91)	3	(9)	15.00	2.65
34-35	34	0	(0)	18	(53)	5	(15)	23	(68)	11	(32)	11.73	3.69
36-37	24	2	(8)	7	(29)	2	(8)	11	(46)	13	(54)	13.31	3.45
38-39	11	0	(0)	2	(18)	0	(0)	2	(18)	9	(82)	15.33	4.21
40-41	3	0	(0)	0	(0)	0	(0)	0	(0)	3	(100)	22.33	6.81
42-43	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
44-45	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(20)	-
Total	155	16	(10)	76	(49)	17	(11)	109	(70)	46	(30)		

Table 50. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 2; collection date 7 August, 1978; field number PLRS-78-155. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	20	19	(95)	1	(5)	0	(0)	20	(100)	0	(0)	-	-
20-21	9	7	(78)	2	(22)	0	(0)	9	(100)	0	(0)	-	-
22-23	12	7	(58)	5	(42)	0	(0)	12	(100)	0	(0)	-	-
24-25	16	4	(25)	10	(62)	2	(12)	16	(100)	0	(0)	-	-
26-27	8	2	(25)	4	(50)	0	(0)	6	(75)	2	(25)	6.00	1.41
28-29	12	0	(0)	5	(42)	1	(8)	6	(50)	6	(50)	10.50	4.04
30-31	20	1	(5)	8	(40)	2	(10)	11	(55)	9	(45)	13.78	8.64
32-33	25	0	(0)	11	(44)	3	(12)	14	(56)	11	(44)	11.45	3.47
34-35	18	0	(0)	7	(39)	1	(6)	8	(44)	10	(56)	13.90	4.75
36-37	14	0	(0)	3	(21)	1	(7)	4	(29)	10	(71)	16.60	2.72
38-39	5	0	(0)	0	(0)	1	(20)	1	(20)	4	(80)	17.25	2.75
40-41	5	0	(0)	1	(20)	0	(0)	1	(20)	4	(80)	13.75	3.30
42-43	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(22)	-
Total	165	40	(24)	57	(35)	11	(7)	108	(65)	57	(35)		

Table 51. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 2; collection date 5 September, 1978; field number PLRS-78-159. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Brood	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
20-21	42	41	(98)	1	(2)	0	(0)	42	(100)	0	(0)	-	-
22-23	31	27	(87)	4	(13)	0	(0)	31	(100)	0	(0)	-	-
24-25	21	14	(67)	4	(19)	1	(5)	19	(90)	2	(10)	9.00	1.41
26-27	6	1	(17)	1	(17)	1	(17)	3	(50)	3	(50)	5.67	2.08
28-29	12	1	(8)	3	(25)	0	(0)	4	(33)	8	(67)	8.75	3.01
30-31	9	1	(11)	2	(22)	0	(0)	3	(33)	6	(67)	11.17	5.42
32-33	5	0	(0)	1	(20)	0	(0)	1	(20)	4	(80)	16.50	6.76
34-35	7	0	(0)	3	(43)	0	(0)	3	(43)	4	(57)	9.75	3.10
36-37	5	0	(0)	2	(40)	1	(20)	3	(60)	2	(40)	17.00	1.41
38-39	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	10.50	12.02
40-41	3	0	(0)	1	(33)	0	(0)	1	(33)	2	(67)	24.00	15.56
42-43	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
44-45	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	169	109	(64)	24	(14)	3	(2)	136	(80)	33	(20)		

Table 52. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 3 October, 1978; field number PLRS-78-163. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)	-	-
20-21	27	27	(100)	0	(0)	0	(0)	27	(100)	0	(0)	-	-
22-23	47	46	(98)	0	(0)	0	(0)	46	(98)	1	(2)	(7)	-
24-25	26	25	(96)	0	(0)	0	(0)	25	(96)	1	(4)	(7)	-
26-27	18	15	(83)	0	(0)	0	(0)	15	(83)	3	(17)	5.33	1.53
28-29	16	9	(56)	0	(0)	0	(0)	9	(56)	7	(44)	6.71	1.80
30-31	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
32-33	5	2	(40)	1	(20)	0	(0)	3	(60)	2	(40)	9.50	2.12
34-35	3	0	(0)	1	(33)	0	(0)	1	(33)	2	(67)	18.00	2.83
36-37	6	1	(17)	3	(50)	0	(0)	4	(67)	2	(33)	12.50	0.71
38-39	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(22)	-
Total	166	142	(86)	5	(3)	0	(0)	147	(89)	19	(11)		

Table 53. Summary of reproductive data for female *Poecilia Latipinna* from Station 2; collection date 09 November 1978; field number PLRS-78-167. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)	-	-
20-21	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)	-	-
22-23	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
24-25	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
26-27	15	15	(100)	0	(0)	0	(0)	15	(100)	0	(0)	-	-
28-29	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
30-31	10	9	(90)	1	(10)	0	(0)	10	(100)	0	(0)	-	-
32-33	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
34-35	9	8	(89)	1	(11)	0	(0)	9	(100)	0	(0)	-	-
36-37	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
38-39	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
40-41	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
42-43	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
TOTAL	156	154		2		0		156					

Table 54. Summary of reproductive data for female *Poecilia latipinna* from Station 2; collection date 05 December 1978; field number PLRS-78-171. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
20-21	15	15	(100)	0	(0)	0	(0)	15	(100)	0	(0)	-	-
22-23	42	42	(100)	0	(0)	0	(0)	42	(100)	0	(0)	-	-
24-25	42	42	(100)	0	(0)	0	(0)	42	(100)	0	(0)	-	-
26-27	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
28-29	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
30-31	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
32-33	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
34-35	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
36-37	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
40-41	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
42-43	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
44-45	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
TOTAL	150	150	(100)	0	(0)	0	(0)	150	(100)	0	(0)		

Table 55. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 3; collection date 19 October 1976; field number PLRS 76-4. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18-19	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
20-21	27	27	(100)	0	(0)	0	(0)	27	(100)	0	(0)	-	-
22-23	42	42	(100)	0	(0)	0	(0)	42	(100)	0	(0)	-	-
24-25	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
26-27	17	13	(76)	4	(24)	0	(0)	17	(100)	0	(0)	-	-
28-29	17	16	(94)	1	(6)	0	(0)	17	(100)	0	(0)	-	-
30-31	12	11	(92)	0	(0)	0	(0)	11	(92)	1	(8)	(7)	-
32-33	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
34-35	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(8)	-
36-37	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
38-39	0	-		-		-		-		-		-	-
40-41	0	-		-		-		-		-		-	-
42-43	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
TOTAL	160	153	(96)	5	(3)	0	(0)	158	(99)	2	(1)		

Table 56. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 1 November 1976; field number PLRS 76-11. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpreg. N	(%)	Pregnant N	(%)	Embryos/Brood $\bar{X}$	σ
18-19	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
20-21	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)	-	-
22-23	33	33	(100)	0	(0)	0	(0)	33	(100)	0	(0)	-	-
24-25	39	38	(97)	0	(0)	0	(0)	38	(97)	1	(3)	(3)	-
26-27	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)	-	-
28-29	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
30-31	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
32-33	10	8	(80)	1	(10)	0	(0)	9	(90)	1	(10)	(3)	-
34-35	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
36-37	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(11)	-
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	
40-41	0	-		-		-		-		-		-	-
42-43	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(31)	-
TOTAL	168	163	(97)	1	(1)	0	(0)	164	(98)	4	(2)		

Table 57. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 3 December 1976; field number PLRS-77-20.

Size Group mm SL	N	Undevel. Ovaries N	Undevel. Ovaries (%)	Developing Ova N	Developing Ova (%)	Mature Ova N	Mature Ova (%)	Total Nonpregn. N	Total Nonpregn. (%)	Pregnant N	Pregnant (%)	Embryos/Broods $\bar{X}$	Embryos/Broods ♂
18-19	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
20-21	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)	-	-
22-23	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)	-	-
24-25	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
26-27	22	22	(100)	0	(0)	0	(0)	22	(100)	0	(0)	-	-
28-29	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)	-	-
30-31	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
32-33	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)	-	-
34-35	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
36-37	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
38-39	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
40-41	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
42-43	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
44-45	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
46-47	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
48-49	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	156	156	(100)	0	(0)	0	(0)	156	(100)	0	(0)		

Table 58. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 4 January 1977; field number PLRS-77-24.

Size Group mm SL	N	Undevel. Ovaries N	Undevel. Ovaries (%)	Developing Ova N	Developing Ova (%)	Mature Ova N	Mature Ova (%)	Total Nonpregn. N	Total Nonpregn. (%)	Pregnant N	Pregnant (%)	Embryos/Broods $\bar{X}$	Embryos/Broods σ
18-19	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
20-21	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
22-23	15	15	(100)	0	(0)	0	(0)	15	(100)	0	(0)	-	-
24-25	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
26-27	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
28-29	26	26	(100)	0	(0)	0	(0)	26	(100)	0	(0)	-	-
30-31	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
32-33	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
34-35	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
36-37	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
38-39	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)	-	-
40-41	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
42-43	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
44-45	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
46-47	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	174	174	(100)	0	(0)	0	(0)	174	(100)	0	(0)		

Table 59. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 3 February 1977; field number PLRS-77-37.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Maturc Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\overline{X}$	σ
18-19	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)	-	-
20-21	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)	-	-
22-23	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)	-	-
24-25	19	18	(95)	1	(5)	0	(0)	19	(100)	0	(0)	-	-
26-27	13	11	(85)	2	(15)	0	(0)	13	(100)	0	(0)	-	-
28-29	25	23	(92)	2	(8)	9	(0)	25	(100)	0	(0)	-	-
30-31	17	15	(88)	2	(12)	0	(0)	17	(100)	0	(0)	-	-
32-33	14	10	(71)	4	(29)	0	(0)	14	(100)	0	(0)	-	-
34-35	11	10	(91)	1	(9)	0	(0)	11	(100)	0	(0)	-	-
36-37	5	4	(80)	1	(20)	0	(0)	5	(100)	0	(0)	-	-
38-39	6	5	(83)	1	(17)	0	(0)	6	(100)	0	(0)	-	-
40-41	6	5	(83)	1	(17)	0	(0)	6	(100)	0	(0)	-	-
42-43	7	6	(86)	1	(14)	0	(0)	7	(100)	0	(0)	-	-
44-45	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
46-47	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
48-49	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	161	145	(90)	16	(10)	0	(0)	161	(100)	0	(0)		

Table 60. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 2 March 1977; field number PLRS-77-43.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	σ
18-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
22-23	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
24-25	17	17	(100)	0	(0)	0	(0)	17	(100)	0	(0)	-	-
26-27	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
28-29	19	17	(89)	2	(11)	0	(0)	19	(100)	0	(0)	-	-
30-31	25	23	(92)	2	(8)	0	(0)	25	(100)	0	(0)	-	-
32-33	21	19	(90)	2	(10)	0	(0)	21	(100)	0	(0)	-	-
34-35	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
36-37	8	6	(75)	2	(25)	0	(0)	8	(100)	0	(0)	-	-
38-39	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
40-41	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
42-43	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
44-45	3	1	(33)	2	(67)	0	(0)	3	(100)	0	(0)	-	-
46-47	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
48-49	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	163	152	(93)	11	(7)	0	(0)	163	(100)	0	(0)		

Table 61. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 3; collection date 29 March 1977; field number PLRS-77-52. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\overline{X}$	σ
18-19	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)	-	-
20-21	17	16	(94)	1	(6)	0	(0)	17	(100)	0	(0)	-	-
22-23	27	24	(89)	3	(11)	0	(0)	27	(100)	0	(0)	-	-
24-25	33	20	(61)	13	(39)	0	(0)	33	(100)	0	(0)	-	-
26-27	37	19	(51)	18	(49)	0	(0)	37	(100)	0	(0)	-	-
28-29	17	5	(29)	12	(71)	0	(0)	17	(100)	0	(0)	-	-
30-31	13	4	(31)	9	(69)	0	(0)	13	(100)	0	(0)	-	-
32-33	10	0	(0)	8	(80)	2	(20)	10	(100)	0	(0)	-	-
34-35	3	1	(33)	1	(33)	1	(33)	3	(100)	0	(0)	-	-
36-37	1	0	(0)	0	(0)	1	(100)	1	(100)	0	(0)	-	-
38-39	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
40-41	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
42-43	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(28)	-
44-45	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(35)	-
46-47	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(42)	-
Total	173	100	(58)	66	(38)	4	(2)	170	(98)	3	(2)		

Table 62. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 9 May 1977; field number PLRS-77-58. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)	-	-
20-21	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
22-23	44	43	(98)	1	(2)	0	(0)	44	(100)	0	(0)	-	-
24-25	33	28	(85)	5	(15)	0	(0)	33	(100)	0	(0)	-	-
26-27	27	16	(59)	6	(22)	3	(11)	25	(93)	2	(7)	9.50	3.54
28-29	23	9	(39)	12	(52)	2	(9)	23	(100)	0	(0)	-	-
30-31	20	2	(10)	4	(20)	2	(10)	8	(40)	12	(60)	13.80	2.61
32-33	6	0	(0)	2	(33)	1	(17)	3	(50)	3	(50)	15.33	2.89
34-35	5	0	(0)	3	(60)	0	(0)	3	(60)	2	(40)	14.50	0.71
36-37	5	0	(0)	2	(40)	0	(0)	2	(40)	3	(60)	18.33	4.73
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
42-43	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
44-45	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	192	127	(66)	35	(18)	8	(	170	(89)	22	(11)		

Table 63. Summary of reproductive data for female Poecilia latipinna from Station 3 collection date 9 June 1977: field number PLRS-77-75. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
20-21	25	25	(100)	0	(0)	0	(0)	25	(100)	0	(0)	-	-
22-23	24	21	(88)	3	(13)	0	(0)	24	(100)	0	(0)	-	-
24-25	29	19	(66)	10	(34)	0	(0)	29	(100)	0	(0)	-	-
26-27	25	6	(24)	19	(76)	0	(0)	25	(100)	0	(0)	-	-
28-29	12	4	(33)	8	(67)	0	(0)	12	(100)	0	(0)	-	-
30-31	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
32-33	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
34-35	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(18)	-
36-37	4	0	(0)	3	(75)	0	(0)	3	(75)	1	(25)	(20)	-
38-39	3	0	(0)	0	(0)	0	(0)	0	(0)	3	(100)	22.33	7.02
40-41	4	0	(0)	1	(25)	1	(25)	2	(50)	2	(50)	37.50	23.33
42-43	2	0	(0)	0	(0)	1	(50)	1	(50)	1	(50)	(24)	-
Total	154	99	(64)	45	(29)	2	(1)	146	(95)	8	(5)		

Table 64. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 7 July 1977; field number PLRS-77-80. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18-19	18	18	(100)	0	(0)	0	(0)	18		0	(0)	-	-
20-21	49	49	(100)	0	(0)	0	(0)	49		0	(0)	-	-
22-23	29	29	(100)	0	(0)	0	(0)	29		0	(0)	-	-
24-25	21	21	(100)	0	(0)	0	(0)	21		0	(0)	-	-
26-27	7	7	(100)	0	(0)	0	(0)	7		0	(0)	-	-
28-29	9	9	(100)	0	(0)	0	(0)	9		0	(0)	-	-
30-31	9	9	(100)	0	(0)	0	(0)	9		0	(0)	-	-
32-33	7	2	(29)	2	(29)	3	(43)	7	(100)	0	(0)	-	-
34-35	6	2	(33)	0	(0)	4	(67)	6	(100)	0	(0)	-	-
36-37	3	0	(0)	0	(0)	2	(67)	2	(67)	1	(33)	(26)	-
38-39	2	0	(0)	1	(50)	0	(0)	1	(50)	1	(50)	(26)	-
Total	160	146	(91)	3	(2)	9	(6)	158	(99)	2	(1)		

Table 65. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 9 August 1977; field number PLRS-77-85. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
20-21	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)	-	-
22-23	22	20	(91)	2	(9)	0	(0)	22	(100)	0	(0)	-	-
24-25	21	16	(76)	5	(24)	0	(0)	21	(100)	0	(0)	-	-
26-27	35	24	(69)	10	(29)	1	(3)	35	(100)	0	(0)	-	-
28-29	16	6	(38)	7	(44)	3	(19)	16	(100)	0	(0)	-	-
30-31	15	3	(20)	3	(20)	2	(13)	8	(53)	7	(47)	9.43	1.99
32-33	10	0	(0)	2	(20)	3	(30)	5	(50)	5	(50)	16.00	5.58
34-35	6	0	(0)	3	(50)	3	(50)	6	(100)	0	(0)	-	-
36-37	3	0	(0)	2	(67)	1	(33)	3	(100)	0	(0)	-	-
38-39	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
40-41	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	165	104	(63)	36	(22)	13	(8)	153	(93)	12	(7)		

Table 66. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 6 September 1977; field number PLRS-77-93. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
18–19	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
20–21	6	3	(50)	1	(17)	2	(33)	6	(100)	0	(0)	-	-
22–23	7	3	(43)	2	(29)	1	(14)	6	(86)	1	(14)	(6)	-
24–25	8	1	(13)	1	(13)	3	(38)	5	(63)	3	(38)	6.33	3.21
26–27	17	0	(0)	3	(18)	3	(18)	6	(35)	11	(65)	8.82	2.67
28–29	19	1	(5)	4	(21)	2	(11)	7	(37)	12	(63)	11.50	2.39
30–31	9	0	(0)	1	(11)	1	(11)	2	(22)	7	(78)	13.00	2.45
32–33	16	0	(0)	2	(13)	5	(31)	7	(44)	9	(56)	12.44	2.65
34–35	18	0	(0)	3	(17)	8	(44)	11	(51)	7	(39)	16.57	4.72
36–37	25	0	(0)	6	(24)	12	(48)	18	(72)	7	(28)	25.85	5.61
38–39	18	0	(0)	6	(33)	2	(11)	8	(44)	10	(56)	23.90	3.98
40–41	8	0	(0)	3	(38)	1	(6)	4	(50)	4	(50)	28.25	8.66
42–43	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	28.00	5.66

Table 66. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 6 September 1977; field number PLRS-77-93. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations (continued).

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Embryos/Broods $\bar{X}$	s
44-45	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(34)	-
46-47	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(30)	-
Total	159	12	(8)	32	(20)	40	(25)	84	(53)	75	(47)		

Table 67. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 3; collection date 8 October 1977; field number PLRS-77-108. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
22-23	3	2	(67)	0	(0)	0	(0)	2	(67)	1	(33)	(5)	-
24-25	7	3	(43)	1	(14)	0	(0)	4	(57)	3	(43)	6.00	1.73
26-27	6	3	(50)	1	(17)	0	(0)	4	(67)	2	(33)	5.55	0.71
28-29	11	2	(18)	2	(18)	0	(0)	4	(36)	7	(64)	6.86	3.29
30-31	13	4	(31)	2	(15)	0	(0)	6	(46)	7	(54)	8.86	2.41
32-33	14	4	(29)	4	(29)	0	(0)	8	(57)	6	(43)	8.83	1.47
34-35	8	3	(38)	3	(38)	0	(0)	6	(75)	2	(25)	9.50	3.54
36-37	15	4	(27)	3	(20)	0	(0)	7	(47)	8	(53)	19.25	10.17
38-39	14	2	(14)	4	(29)	1	(7)	7	(50)	7	(50)	13.71	3.68
40-41	11	2	(18)	1	(9)	0	(0)	3	(27)	8	(73)	22.75	7.15
42-43	9	3	(33)	3	(33)	1	(11)	7	(78)	2	(22)	13.00	1.41
44-45	4	0	(0)	1	(25)	1	(25)	2	(50)	2	(50)	17.00	1.41
46-47	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
Total	121	38	(31)	25	(21)	3	(2)	66	(55)	55	(45)		

Table 68. Summary of reproductive data for female <u>Poecilia</u> <u>latipinna</u> from Station 3; collection date 5 November 1977; field number PLRS-77-111.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	*	
20-21	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
22-23	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
24-25	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)		
26-27	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)		
28-29	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
30-31	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)		
32-33	30	28	(93)	0	(0)	0	(0)	28	(93)	2	(7)	*	
34-35	17	15	(88)	0	(0)	0	(0)	15	(88)	2	(12)	*	
36-37	21	20	(95)	0	(0)	0	(0)	20	(95)	1	(5)	*	
38-39	29	27	(93)	1	(3)	1	(3)	29	(100)	0	(0)		
40-41	13	11	(85)	1	(8)	0	(0)	12	(92)	1	(8)	*	

Table 68. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 3; collection date 5 November 1977; field number PLRS-77-111. (Continued)

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
42-43	6	5	(83)	0	(0)	0	(0)	5	(83)	1	(17)	*	
44-45	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
46-47	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
48-49	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	158	147	(93)	2	(1)	1	(1)	150	(95)	8	(5)		

* Only 3 of 8 pregnant females carried broods that were normal. Five females had broods with unusually large percentages of abnormal embryos or unfertilized eggs. Overall, out of 68 total embryos sampled, only 28 (41%) were normal. Thus, no statistics were calculated.

Table 69. **Summary of reproductive data for female** <u>Poecilia latipinna</u> from Station 3; collection date 4 December 1977; field number PLRS-77-116. Values in parenthesis in the column labeled mean number of embryos per brood are *not means* but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)		
20-21	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)		
22-23	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)		
24-25	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)		
26-27	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)		
28-29	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
30-31	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
32-33	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
34-35	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
36-37	3	3	(100)	0	(0)	0	(0)	[illegible]	(100)	0	(0)		
38-39	0	0	(100)	0	(0)	0	(0)	0	(100)	0	(0)		
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	58	58	(100)	0	(0)	0	(0)	58	(100)	0	(0)		

Table 70. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 7 January 1978; field number PLRS-78-121. Values in parenthesis in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	18	18	(100)	0	(0)	0	(0)	18	(100)	0	(0)		
20-21	9	9	(100)	0	(0)	0	(0)	9	(100)	0	(0)		
22-23	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)		
24-25	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)		
26-27	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)		
28-29	12	12	(100)	0	(0)	0	(0)	12	(100)	0	(0)		
30-31	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)		
32-33	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)		
34-35	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)		
Total	79	79	(100)	0	(0)	0	(0)	79	(100)	0	(0)		

Table 71. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 6 February 1978; field number PLRS-78-128.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	30	30	(100)	0	(0)	0	(0)	30	(100)	0	(0)		
20-21	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)		
22-23	27	27	(100)	0	(0)	0	(0)	27	(100)	0	(0)		
24-25	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)		
26-27	14	14	(100)	0	(0)	0	(0)	14	(100)	0	(0)		
28-29	7	6	(86)	1	(14)	0	(0)	7	(100)	0	(0)		
30-31	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)		
32-33	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)		
34-35	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)		
36-37	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)		
38-39	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
40-41	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		

Table 71. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 6 February 1978; field number PLRS-78-128. (Continued)

Size Group mm SL	N	Undevel. Ovaries N	Undevel. Ovaries (%)	Developing Ova N	Developing Ova (%)	Mature Ova N	Mature Ova (%)	Total Nonpregn. N	Total Nonpregn. (%)	Pregnant N	Pregnant (%)	Normal Embryos/Broods $\bar{X}$	Normal Embryos/Broods s
42-43	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
44-45	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
46-47	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)		
48-49	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	130	128	(98)	2	(2)	0	(0)	130	(100)	0	(0)		

Table 72. Summary of reproductive data for female <u>Poecilia latipinna</u> from Station 3; collection date 6 March 1978; field number PLRS-78-134.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	20	20	(100)	0	(0)	0	(0)	20	(100)	0	(0)		
20-21	11	11	(100)	0	(0)	0	(0)	11	(100)	0	(0)		
22-23	10	10	(100)	0	(0)	0	(0)	10	(100)	0	(0)		
24-25	13	11	(85)	2	(15)	0	(0)	13	(100)	0	(0)		
26-27	8	7	(88)	1	(12)	0	(0)	8	(100)	0	(0)		
28-29	16	13	(81)	3	(19)	0	(0)	16	(100)	0	(0)		
30-31	8	7	(88)	1	(12)	0	(0)	8	(100)	0	(0)		
32-33	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)		
34-35	2	1	(50)	1	(50)	0	(0)	2	(100)	0	(0)		
36-37	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
38-39	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
40-41	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)		
42-43	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)		
Total	98	90	(92)	8	(8)	0	(0)	98	(100)	0	(0)		

Table 73. Summary of reproductive data for female Poecilia latipinna from Station 3; collection date 6 April 1978; field number PLRS-78-138. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
20-21	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
22-23	10	3	(30)	7	(70)	0	(0)	10	(100)	0	(0)	-	-
24-25	15	2	(1[illegible]	10	(67)	3	(20)	15	(100)	0	(0)	-	-
26-27	15	0	(0)	9	(60)	5	(33)	14	(93)	1	(7)	(11)	-
28-29	16	0	(0)	4	(25)	6	(38)	10	(62)	6	(38)	12.00	0.89
30-31	13	0	(0)	2	(15)	5	(38)	7	(54)	6	(46)	13.33	1.63
32-33	14	0	(0)	0	(0)	1	(7)	1	(7)	13	(93)	16.92	2.60
34-35	18	0	(0)	0	(0)	4	(22)	4	(22)	14	(78)	18.77	4.82
36-37	22	0	(0)	1	(5)	0	(0)	1	(5)	21	(95)	22.00	4.18
38-39	11	0	(0)	0	(0)	1	(9)	1	(9)	10	(91)	26.40	4.70
40-41	8	0	(0)	1	(12)	0	(0)	1	(12)	7	(88)	28.86	4.78
42-43	5	0	(0)	0	(0)	0	(0)	0	(0)	5	(100)	35.60	4.72
44-45	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
46-47	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	36.00	1.41
48-49	1	0	(0)	0	(0)	1	(100)	1	(100)	0	(0)	-	-
Total	151	6	(4)	34	(23)	26	(17)	66	(44)	85	(56)		

Table 74. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 12 May 1978; field number PLRS-78-143. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
20-21	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
22-23	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
24-25	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
26-27	11	0	(0)	4	(36)	1	(9)	5	(45)	6	(55)	8.00	2.68
28-29	16	0	(0)	9	(56)	0	(0)	9	(56)	7	(44)	10.14	1.22
30-31	22	0	(0)	12	(55)	2	(9)	14	(64)	8	(36)	12.75	3.54
32-33	26	0	(0)	15	(58)	2	(8)	17	(65)	9	(35)	14.89	3.98
34-35	20	0	(0)	3	(15)	3	(15)	6	(30)	14	(70)	20.64	4.01
36-37	23	0	(0)	3	(13)	3	(13)	6	(26)	17	(74)	25.47	4.00
38-39	24	0	(0)	2	(8)	0	(0)	2	(8)	22	(92)	25.68	5.36
40-41	10	0	(0)	0	(0)	0	(0)	0	(0)	10	(100)	30.20	5.31
42-43	4	0	(0)	0	(0)	0	(0)	0	(0)	4	(100)	31.50	4.80
44-45	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(28)	-
46-47	2	1	(50)	0	(0)	0	(0)	1	(50)	1	(50)	(43)	-
48-49	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(42)	-
Total	161	2	(1)	48	(30)	11	(7)	61	(38)	100	(62)		

Table 75. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 14 June 1978; field number PLRS-78-149. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Broods	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	83	83	(100)	0	(0)	0	(0)	83	(100)	0	(0)	-	-
20-21	23	23	(100)	0	(0)	0	(0)	23	(100)	0	(0)	-	-
22-23	6	6	(100)	0	(0)	0	(0)	6	(100)	0	(0)	-	-
24-25	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
26-27	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
28-29	3	0	(0)	3	(100)	0	(0)	3	(100)	0	(0)	-	-
30-31	12	0	(0)	5	(42)	0	(0)	5	(42)	7	(58)	8.71	2.06
32-33	10	1	(10)	7	(70)	0	(0)	8	(80)	2	(20)	14.00	5.66
34-35	6	0	(0)	3	(50)	2	(33)	5	(83)	1	(17)	(23)	-
36-37	4	0	(0)	2	(50)	1	(25)	3	(75)	1	(25)	(24)	-
38-39	5	0	(0)	1	(20)	0	(0)	1	(20)	4	(80)	22.75	7.41
40-41	9	0	(0)	4	(44)	2	(22)	6	(67)	3	(33)	25.67	8.50
42-43	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(24)	-
44-45	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
Total	163	113	(69)	26	(16)	5	(3)	144	(88)	19	(12)		

Table 76. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 10 July 1978; field number PLRS-78-153. Values in parentheses in the col labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	20	19	(95)	1	(5)	0	(0)	20	(100)	0	(0)	-	-
22-23	38	33	(87)	5	(13)	0	(0)	38	(100)	0	(0)	-	-
24-25	42	39	(93)	3	(7)	0	(0)	42	(100)	0	(0)	-	-
26-27	34	29	(85)	5	(15)	0	(0)	34	(100)	0	(0)	-	-
28-29	11	8	(73)	3	(27)	0	(0)	11	(100)	0	(0)	-	-
30-31	2	0	(0)	2	(100)	0	(0)	2	(100)	0	(0)	-	-
32-33	0	0	(0)	0	(0)	0	(0)	0	(0)	0	(0)	-	-
34-35	1	0	(0)	1	(100)	0	(0)	1	(100)	0	(0)	-	-
36-37	3	0	(0)	2	(67)	1	(33)	3	(100)	0	(0)	-	-
38-39	2	0	(0)	1	(50)	0	(0)	1	(50)	1	(50)	(15)	-
40-41	2	0	(0)	2	(100)	0	(0)	2	(100)	0	(0)	-	-
42-43	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(14)	-
Total	159	131	(82)	25	(16)	1	(1)	157	(99)	2	(1)		

Table 77. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 7 August, 1978; field number PLRS-78-157. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
18-19	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
20-21	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
22-23	7	5	(71)	2	(29)	0	(0)	7	(100)	0	(C)	-	-
24-25	8	4	(50)	4	(50)	0	(0)	8	(100)	0	(0)	-	-
26-27	27	3	(11)	24	(89)	0	(0)	27	(100)	0	(0)	-	-
28-29	36	2	(6)	28	(78)	5	(14)	35	(97)	1	(3)	(6)	-
30-31	23	1	(4)	12	(52)	5	(22)	18	(78)	5	(22)	10.20	2.39
32-33	9	0	(0)	3	(33)	3	(33)	6	(67)	3	(33)	10.67	2.31
34-35	3	0	(0)	0	(0)	1	(33)	1	(33)	2	(67)	8.00	1.41
36-37	3	0	(0)	1	(33)	1	(33)	2	(67)	1	(33)	(14)	-
38-39	5	0	(0)	3	(60)	1	(20)	4	(80)	1	(20)	(14)	-
40-41	11	0	(0)	3	(27)	1	(9)	4	(36)	7	(64)	19.86	5.61
42-43	8	0	(0)	5	(62)	2	(25)	7	(88)	1	(12)	(15)	-
44-45	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(28)	-
Total	151	25	(17)	85	(56)	19	(13)	129	(85)	22	(15)		

Table 78. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 5 September, 1978; field number PLRS-78-161. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group		Undevel. Ovaries		Developing Ova		Mature Ova		Total Nonpregn.		Pregnant		Normal Embryos/Brood	
mm SL	N	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	$\bar{X}$	s
18-19	22	22	(100)	0	(0)	0	(0)	22	(100)	0	(0)	-	-
20-21	6	4	(67)	2	(33)	0	(0)	6	(100)	0	(0)	-	-
22-23	4	3	(75)	1	(25)	0	(0)	4	(100)	0	(0)	-	-
24-25	5	1	(20)	2	(40)	1	(20)	4	(80)	1	(20)	(7)	-
26-27	4	1	(25)	1	(25)	0	(0)	2	(50)	2	(50)	4.00	1.41
28-29	21	3	(14)	9	(43)	1	(5)	13	(62)	8	(38)	7.12	1.89
30-31	16	0	(0)	5	(31)	1	(6)	6	(38)	10	(62)	9.70	4.32
32-33	14	0	(0)	5	(36)	1	(7)	6	(43)	8	(57)	11 25	3.96
34-35	9	0	(0)	4	(44)	0	(0)	4	(44)	5	(56)	12.00	3.24
36-37	8	0	(0)	2	(25)	1	(12)	3	(38)	5	(62)	15.20	3.27
38-39	22	0	(0)	12	(55)	1	(5)	13	(59)	9	(41)	16.67	4.97
40-41	12	0	(0)	6	(50)	0	(0)	6	(50)	6	(50)	19.67	4.84

Table 78. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 5 September, 1978; field number PLRS-78-161. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations. (Continued).

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
42-43	5	0	(0)	3	(60)	0	(0)	3	(60)	2	(40)	18.50	3.54
44-45	2	0	(0)	0	(0)	0	(0)	0	(0)	2	(100)	29.00	1.41
46-47	3	0	(0)	1	(33)	0	(0)	1	(33)	2	(67)	21.00	8.49
48-49	1	0	(0)	0	(0)	0	(0)	0	(0)	1	(100)	(29)	-
Total	154	34	(22)	53	(34)	6	(4)	93	(60)	61	(40)		

Table 79. Summary of reproductive data for female *Poecilia latipinna* from Station 3; collection date 3 October, 1978; field number PLRS-78-165. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Brood $\bar{X}$	s
[illegible]-19	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
20-21	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
22-23	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
24-25	6	5	(83)	0	(0)	0	(0)	5	(83)	1	(17)	(8)	-
26-27	9	8	(89)	0	(0)	0	(0)	8	(89)	1	(11)	(7)	-
28-29	17	7	(41)	1	(6)	1	(6)	9	(53)	8	(47)	6.75	1.04
30-31	22	7	(32)	4	(18)	3	(14)	14	(64)	8	(36)	9.75	3.33
32-33	28	5	(18)	0	(0)	2	(7)	7	(25)	21	(75)	11.95	3.75
34-35	23	7	(30)	1	(4)	1	(4)	9	(39)	14	(61)	13.64	4.88
36-37	11	1	(9)	0	(0)	0	(0)	1	(9)	10	(91)	19.30	6.36
38-39	5	1	(20)	0	(0)	0	(0)	1	(20)	4	(80)	18.25	6.80
40-41	9	3	(33)	3	(33)	0	(0)	6	(67)	3	(33)	23.67	2.89
42-43	3	0	(0)	0	(0)	0	(0)	0	(0)	3	(100)	30.00	8.00
44-45	2	0	(0)	0	(0)	1	(50)	1	(50)	1	(50)	(23)	-
Total	146	55	(38)	9	(6)	8	(5)	72	(49)	74	(51)		

Table 80. Summary of reproductive data for female *Poecilia Latipinna* from Station 3; collection date 09 November 1978; field number PLRS-78-169. Values in parentheses in the column labeled mean number of embryos per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
20-21	1	1	(100)	0	(0)	0	(0)	1	(100)	0	(0)	-	-
22-23	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
24-25	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
26-27	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
28-29	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
30-31	4	4	(100)	0	(0)	0	(0)	4	(100)	0	(0)	-	-
32-33	15	13	(87)	2	(13)	0	(0)	15	(100)	0	(0)	-	-
34-35	21	21	(100)	0	(0)	0	(0)	21	(100)	0	(0)	-	-
36-37	16	13	(81)	2	(13)	0	(0)	15	(94)	1	(6)	(7)	-
38-39	18	14	(78)	4	(22)	0	(0)	18	(100)	0	(0)	-	-
40-41	29	26	(90)	3	(10)	0	(0)	29	(100)	0	(0)	-	-
42-43	29	18	(62)	10	(34)	0	(0)	28	(97)	1	(3)	(5)	-
44-45	16	12	(75)	2	(13)	0	(0)	14	(88)	2	(13)	22.5	3.54
46-47	5	4	(80)	1	(20)	0	(0)	5	(100)	0	(0)	-	-
48-49	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
TOTAL	166	138	(83)	24	(14)	0	(0)	162	(98)	4	(2)		

Table 81. Summary of reproductive data for female Poecilia Latipinna from Station 3; collection date 05 December 1978; *field* number PLRS-78-173. Values in parentheses in the column labeled mean number of *embryos* per brood are not means but are single observations.

Size Group mm SL	N	Undevel. Ovaries N	(%)	Developing Ova N	(%)	Mature Ova N	(%)	Total Nonpregn. N	(%)	Pregnant N	(%)	Normal Embryos/Broods $\bar{X}$	s
18-19	7	7	(100)	0	(0)	0	(0)	7	(100)	0	(0)	-	-
20-21	13	13	(100)	0	(0)	0	(0)	13	(100)	0	(0)	-	-
22-23	29	29	(100)	0	(0)	0	(0)	29	(100)	0	(0)	-	-
24-25	24	24	(100)	0	(0)	0	(0)	24	(100)	0	(0)	-	-
26-27	19	19	(100)	0	(0)	0	(0)	19	(100)	0	(0)	-	-
28-29	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
30-31	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
32-33	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
34-35	16	16	(100)	0	(0)	0	(0)	16	(100)	0	(0)	-	-
36-37	8	8	(100)	0	(0)	0	(0)	8	(100)	0	(0)	-	-
38-39	5	5	(100)	0	(0)	0	(0)	5	(100)	0	(0)	-	-
40-41	3	3	(100)	0	(0)	0	(0)	3	(100)	0	(0)	-	-
42-43	2	2	(100)	0	(0)	0	(0)	2	(100)	0	(0)	-	-
TOTAL	152	152		0				152		0			

Table 82. Summary of monthly collections at three sailfin molly study stations.

VAB Study Station (Sta. 1)	October 1976	November 1976	December 1976	January 1977	February 1977	March 1977	April 1977
No. of sites seined	3	2	2	3	3	3	4
No. of seine hauls	3	2	2	6	3	3	6
Total seining time (min.)	2.22	1.61	1.83	3.13	1.77	1.78	1.85
Avg. no. fish caught per min.							
Poecilia latipinna	168.92	703.11	275.96	179.87	338.98	315.73	311.73
Gambusia affinis	-	-	34.97	11.82	119.21	53.93	95.14
Lucania parva	-	-	1.64	5.11	5.65	22.47	24.32
Cyprinodon variegatus	-	-	31.69	5.75	18.64	23.03	45.95
Tow-way Study Station (Sta. 2)							
No. of sites seined	3	5	3	5	1	3	2
No. of seine hauls	3	5	4	8	3	4	2
Total seining time (min.)	1.72	3.06	1.77	4.46	2.40	3.34	1.42
Avg. no. fish caught per min.							
Poecilia latipinna	293.60	239.54	150.28	141.48	128.33	106.29	646.48
Gambusia affinis	-	-	111.30	65.25	199.58	164.07	516.20
Lucania parva	-	-	72.88	24.89	21.25	5.09	100.70
Cyprinodon variegatus	-	-	6.78	2.02	0.45	4.49	14.79
Beach Road Study Station (Sta. 3)							
No. of sites seined	3	3	5	3	2	2	2
No. of seine hauls	3	3	7	8	5	4	1
Total seining time (min.)	4.23	1.80	6.42	15.33	8.74	8.17	2.54
Avg. no. fish caught per min.							
Poecilia latipinna	174.00	311.67	49.69	23.48	35.24	51.77	518.50
Gambusia affinis	-	-	87.23	59.23	66.59	131.82	71.65
Lucania parva	-	-	12.77	4.76	18.19	7.22	10.63
Cyprinodon variegatus	-	-	292.99	83.63	63.27	53.24	190.16

Table 83. Summary of monthly collections at three sailfin molly study stations.

VAB Study Station (Sta. 1)	May 1977	June 1977	July 1977	August 1977	September 1977
No. of sites seined	2	4	3	1	2
No. of seine hauls	3	4	3	1	2
Total seining time (min.)	1.67	3.05	1.58	1.35	2.06
Average no. fish caught per min.					
Poecilia latipinna	328.74	208.85	429.11	642.22	299.61
Gambusia affinis	158.08	126.23	249.37	87.41	104.37
Lucania parva	8.98	4.59	20.25	27.41	69.42
Cyprinodon variegatus	5.99	6.56	69.62	8.89	64.56
Tow-way Study Station (Sta. 2)					
No. of sites seined	3	4	7	8	5
No. of seine hauls	3	4	7	11	5
Total seining time (min.)	1.58	3.07	3.86	5.74	6.12
Average no. fish caught per min.					
Poecilia latipinna	262.03	212.38	204.15	110.45	357.19
Gambusia affinis	415.19	142.02	50.00	54.01	22.88
Lucania parva	84.18	132.57	113.21	47.39	2.61
Cyprinodon variegatus	1.90	20.85	12.69	9.23	0.16
Beach Road Study Station (Sta. 3)					
No. of sites seined	1	2	1	1	1
No. of seine hauls	1	2	1	1	1
Total seining time (min.)	1.11	2.27	1.15	0.99	0.64
Average no fish caught per min.					
Poecilia latipinna	1531.53	270.48	1706.09	1395.96	501.56
Gambusia affinis	715.32	113.66	450.43	225.25	195.31
Lucania parva	0.90	23.35	0.87	0	3.13
Cyprinodon variegatus	19.82	49.34	195.65	508.08	204.69

Table 84. Summary of monthly collections at three sailfin study stations.

VAB Study Station (Sta. 1)	Oct. 1977	Nov. 1977	Dec. 1977	Jan. 1978	Feb. 1978	Mar. 1978
No. of sites seined	3	3	4	5	4	4
No. of seine hauls	6	5	5	6	4	4
Total seining time (min.)	5.44	3.63	4.46	7.49	4.71	1.66
Average no. fish caught per min.						
Poecilia latipinna	39.89	107.99	80.49	13.62	13.80	13.25
Gambusia affinis	124.63	85.40	68.83	26.44	39.89	56.63
Lucania parva	20.04	7.71	1.12	1.34	4.85	6.63
Cyprinodon variegatus	38.60	72.18	26.23	21.76	10.51	6.02
Tow-way Study Station (Sta. 2)						
No. of sites seined	3	3	5	1	1	5
No. of seine hauls	3	6	5	2	5	5
Total seining time (min.)	2.35	4.06	5.48	2.08	5.65	2.37
Average no. fish caught per min.						
Poecilia latipinna	996.17	454.93	151.09	100.96	33.27	49.79
Gambusia affinis	169.36	71.67	43.80	27.88	20.35	102.11
Lucania parva	218.72	80.79	7.30	0.48	0.71	36.29
Cyprinodon variegatus	26.81	5.42	14.96	6.25	0.53	0.84
Beach Road Study Station (Sta. 3)						
No. of sites seined	3	1	2	3	3	2
No. of seine hauls	5	2	3	5	5	4
Total seining time (min.)	4.72	3.11	4.71	7.07	8.12	5.84
Average no. fish caught per min.						
Poecilia latipinna	51.06	171.38	29.09	20.51	28.82	35.96
Gambusia affinis	97.46	194.86	108.07	89.25	44.70	42.88
Lucania parva	0.85	2.57	0.21	0.28	0.37	0.51
Cyprinodon variegatus	199.15	37.30	90.45	357.71	556.90	225.56

Table 35. Summary of monthly collections at three sailfin study stations.

VAB Study Station (Sta. 1)	Apr. 1978	May 1978	June 1978	July 1978
No. of sites seined	3	2	2	2
No. of seine hauls	4	2	2	2
Total seining time (min.)	3.17	2.03	1.55	0.83
Average no. fish caught per min.				
Poecilia latipinna	183.60	292.12	187.10	1096.39
Gambusia affinis	531.55	307.39	168.39	318.07
Lucania parva	26.81	20.69	2.58	18.07
Cyprinodon variegatus	20.50	13.79	13.55	25.30
Tow-way Study Station (Sta. 2)				
No. of sites seined	2	3	7	4
No. of seine hauls	2	3	10	7
Total seining time (min.)	1.81	1.83	6.36	3.84
Average no. fish caught per min.				
Poecilia latipinna	261.88	275.96	67.77	128.13
Gambusia affinis	230.94	354.64	88.68	42.19
Lucania parva	111.60	68.31	31.60	63.02
Cyprinodon variegatus	4.42	3.23	1.42	13.02
Beach Road Study Station (Sta. 3)				
No. of sites seined	7	1	1	4
No. of seine hauls	8	1	1	4
Total seining time (min.)	8.83	1.32	1.28	3.57
Average no. fish caught per min.				
Poecilia latipinna	30.[illegible]4	593.18	425.78	356.58
Gambusia affinis	110.08	1137.88	1192.19	158.82
Lucania parva	0.79	1.52	0.78	0.56
Cyprinodon variegatus	90.60	104.55	92.97	131.09

Table 86. Summary of monthly collections at three sailfin molly study stations.

VAB Study Station (Sta. 1)	Aug. 1978	Sep. 1978	Oct. 1978	Nov. 1978	Dec. 1978
No. of sites seined	1	4	1	2	2
No. of seine hauls	1	4	1	2	2
Total seining time (min.)	1.00	1.90	0.44	1.86	1.30
Average no. fish caught per min.					
Poecilia latipinna	730.00	654.21	806.82	245.16	966.15
Gambusia affinis	91.00	134.21	88.64	34.95	41.54
Lucania parva	16.00	42.63	6.82	5.91	13.08
Cyprinodon variegatus	27.00	59.47	25.00	24.19	18.46
Tow-way Study Station (Sta. 2)					
No. of sites seined	3	4	2	2	2
No. of seine hauls	5	5	3	2	2
Total seining time (min.)	3.05	2.29	1.51	1.14	0.73
Average no. fish caught per min.					
Poecilia latipinna	106.56	486.46	429.14	457.02	2668.49
Gambusia affinis	149.51	382.97	256.95	255.26	606.85
Lucania parva	53.77	40.17	61.59	0.88	1.37
Cyprinodon variegatus	12.46	9.61	2.65	4.39	34.25
Beach Road Study Station (Sta. 3)					
No. of sites seined	4	4	5	1	2
No. of seine hauls	4	4	5	1	3
Total seining time (min.)	5.44	2.54	2.56	1.19	3 71
Average no. fish caugh per min.					
Poecilia latipinna	67.28	216.14	251.56	432.77	138.27
Gambusia affinis	102.94	348.03	255.47	48.74	42.05
Lucania parva	0.74	1.97	0	3.36	4.85
Cyprinodon variegatus	101.65	483.46	523.44	103.36	165.23

Table 87. The frequency of pregnancy among adult female Poecilia latipinna from three study stations for 1977 and 1978. Adult females are those equal to or exceeding 22.0 mm SL for VABI and TOWY, and equal or exceeding 24.0 mm SL at BCHRD.

Month, Year	VABI			TOWY			BCHRD		
	Ad.♀ N	Preg. ♀ n	(%)	Ad.♀ N	Preg. ♀ n	(%)	Ad.♀ N	Preg. ♀ n	(%)
Apr., 1977	84	5	(6)	123	28	(23)	118	3	(3)
May, 1977	100	36	(36)	175	96	(55)	122	22	(18)
Jun., 1977	138	93	(67)	100	8	(8)	81	8	(10)
Jul., 1977	130	6	(5)	103	10	(10)	64	2	(3)
Aug., 1977	106	28	(26)	135	57	(42)	108	12	(11)
Sep., 1977	108	29	(27)	138	52	(38)	142	74	(52)
Oct., 1977	96	45	(47)	120	23	(19)	113	54	(48)
Nov., 1977	110	0	(0)	105	0	(0)	156	7	(4)
Apr., 1978	109	33	(30)	136	27	(20)	140	85	(61)
May, 1978	151	25	(17)	164	85	(52)	161	100	(62)
Jun., 1978	132	28	(21)	154	89	(58)	51	19	(37)
Jul., 1978	133	57	(43)	149	46	(31)	98	2	(2)
Aug., 1978	160	81	(51)	136	57	(42)	134	22	(16)
Sep., 1978	125	75	(60)	103	33	(32)	122	61	(50)
Oct., 1978	149	27	(18)	125	19	(15)	135	74	(55)
Nov., 1978	147	4	(3)	121	0	(0)	162	4	(2)

Table 88. Standard length frequency distribution for non-pregnant *Poecilia latipinna* in monthly samples from Station 1.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	X̄	s
Station 1																			
Oct., 1976	6	26	53	39	18	4	1	4	-	-	1						152	24.0	2.78
Nov., 1976	46	45	37	20	5	5	2	-	-	2							162	22.1	3.27
Dec., 1976	47	54	27	19	3	-	3	3									156	21.6	2.97
Jan., 1977	45	45	28	19	10	2	2	1	-	2	1						155	22.1	3.63
Feb., 1977	54	56	37	11	1	1											160	21.0	2.02
Mar., 1977	48	43	28	13	10	3	1	1	1	-	-	1					149	21.9	3.52
Apr., 1977	38	36	39	27	10	2	1										153	22.1	2.73
May, 1977	13	34	44	13	4	1	1	1									111	22.4	2.51
June, 1977	19	16	18	12	5	3	5	-	1	1							71	23.8	4.02
July, 1977	5	11	10	10	25	21	32	19	6	-	1						140	28.2	4.33
Aug., 1977	12	34	27	13	3	3	3	9	16	4							124	25.4	5.65
Sept., 1977	18	27	23	13	10	9	7	8	9								124	24.[illegible]	5.01
Oct., 1977	6	11	10	8	8	11	4	4	3	3							68	26.1	5.03
Nov., 1977	16	23	47	23	14	11	6	2	5	2							149	24.3	4.03
Dec., 1977	43	21	34	20	5	8	11	2	1	3	3	1					152	23.7	5.06

Table 89. Standard length frequency distribution for non-pregnant *Poecilia latipinna* in monthly samples from Station 2.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	X̄	s
Station 2																			
Oct., 1976	8	23	34	35	34	8	1	3	5	5	1	1					158	25.3	4.25
Nov., 1976	17	19	30	25	31	10	5	5	5	3	2	1					163	25.1	4.62
Dec., 1976	14	32	26	30	21	12	4	1	4	2							146	24.4	3.89
Jan., 1977	21	47	23	23	24	14	1	1	-	2	1						157	23.6	3.67
Feb., 1977	20	34	43	36	25	9	6	1	3	3							179	24.0	3.66
Mar., 1977	81	40	31	20	13	8	2										195	21.6	3.19
Apr., 1977	18	17	22	19	25	12	10	5	2								130	24.8	4.25
May, 1977	-	5	19	20	16	13	7	3	-	1							84	26.2	3.23
June, 1977	10	45	45	28	9	6	3	-	-	2							147	23.1	2.80
July, 1977	22	32	33	16	11	18	10	1	4								147	24.1	4.04
Aug., 1977	8	17	13	19	16	13	8	5	3	-	1						103	25.6	4.33
Sept., 1977	15	37	49	18	8	4	2	-	2	2	1						138	23.1	3.56
Oct., 1977	16	20	32	26	15	7	5	7	3	1	1						133	24.6	4.30
Nov., 1977	17	24	41	25	11	10	8	4	5	1							146	24.4	4.15
Dec., 1977	11	36	57	16	19	12	1	1	3								156	23.7	3.29

Table 90. Standard length frequency distribution for non-pregnant *Poecilia latipinna* in monthly samples from Station 3.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	$\bar{X}$	s
Station 3																			
Oct., 1976	20	27	42	17	17	17	11	5	-	1	-	-	1				158	24.5	4.24
Nov., 1976	17	26	33	38	13	12	12	9	3	1							164	24.9	4.24
Dec., 1976	12	21	13	20	22	20	16	7	6	5	5	2	5	-	1	1	156	27.9	6.35
Jan., 1977	8	6	15	24	24	26	19	16	3	4	9	8	6	5	1		174	29.9	6.58
Feb., 1977	10	12	11	19	13	25	17	14	11	5	6	6	7	4	-	1	161	29.9	6.87
Mar., 1977	3	8	8	17	16	19	25	21	19	8	3	6	5	3	1	1	163	30.9	6.16
Apr., 1977	11	17	27	33	37	17	13	10	3	1	1						170	25.9	4.09
May, 1977	7	19	44	33	25	23	8	3	3	2	1	1	-	1			170	25.6	4.16
June, 1977	24	25	24	29	25	12	1	-	-	3	-	2	1				146	24.2	4.37
July, 1977	18	49	29	21	7	9	9	7	6	2	1						158	24.2	4.65
Aug., 1977	24	11	22	21	35	16	8	5	6	3	1	1					153	25.7	4.89
Sept.,1977	4	6	6	5	6	7	2	7	11	18	8	4					84	31.6	6.69
Oct., 1977	3	2	2	4	4	4	6	8	6	7	7	3	7	2	1		66	33.5	7.04
Nov., 1977			1	4	9	11	14	28	15	20	29	12	5	1	-	1	150	34.9	4.71
Dec., 1977	8	12	5	9	9	3	3	2	3	3	-	1					58	25.5	5.71

Table 91. Standard length frequency distribution for non-pregnant *Poecilia latipinna* in monthly samples from study station 1 (VABI), 1978

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	$\bar{X}$	S
Station 1																			
Jan., 1978	8	20	21	23	22	21	29	13	11	4	2	1					175	27.4	4.88
Feb., 1978	2	7	17	16	26	35	33	9	5	3	3						156	28.2	3.98
Mar., 1978		11	18	33	[illegible]	25	21	11	8	5	2						160	27.7	4.16
Apr., 1978	25	18	23	25	21	6	1										119	23.3	3.19
May, 1978		2	20	44	28	10	7	7	-	2							128	26.5	2.94
June, 1978	7	4	3	17	38	28	12	4	1	-	-	1					115	27.2	3.56
July, 1978	16	7	6	12	30	22	5	-	-	-	1						99	25.5	4.01
Aug., 1978	2	5	10	3	11	28	17	4	4	1	1						86	28.1	4.00
Sep., 1978	18	9	3	5	6	12	15	7	1	-	1						77	26.0	5.45
Oct., 1978	8	13	13	14	31	30	20	7	6	1							143	27.1	4.09
Nov., 1978	3	3	4	18	18	26	31	26	14	2	2	1	1				149	29.8	4.16
Dec., 1978	3	10	17	15	19	26	44	16	2	-	2						154	28.1	4.00

Table 92. Standard length frequency distribution for non-pregnant *Poecilia latipinna* in monthly samples from study station 2 (TOWY), 1978.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	$\bar{X}$	s
Station 2																			
Jan., 1978	22	49	32	21	14	6	5	1	3	-	1						154	23.2	3.71
Feb., 1978	28	43	32	19	5	5	1	2									135	22.2	3.01
Mar., 1978	2	39	38	33	17	7	6	3	1	-	-	1					147	24.3	3.42
Apr., 1978	7	14	14	24	25	27	11	4	2	-	1	1					130	26.3	4.02
May, 1978			2	4	14	13	18	14	7	4	1	1	-	1			79	30.9	3.82
June, 1978		2	2	5	6	20	15	6	6	4	-	1					67	30.1	3.77
July, 1978	3	3	1	4	3	6	23	30	23	11	2						109	32.0	4.24
Aug., 1978	20	9	12	16	6	6	11	14	8	4	1	1					108	26.6	6.02
Sep., 1978	24	42	31	19	3	4	3	1	3	3	1	1	1				136	23.4	4.92
Oct., 1978	14	27	46	25	15	9	3	3	1	4							147	24.1	3.88
Nov., 1978	3	3	4	18	18	26	31	26	14	2	2	1	1				149	29.8	4.16
Dec., 1978	5	15	42	42	17	12	4	5	4	2	1	-	-	1			150	25.4	4.12

Table 93. Standard length frequency distribution for non-pregnant *Poecilia latipinna* in monthly samples from study station 3 (BCHRD), 1978.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	X̄	s
Station 3																			
Jan., 1978	18	9	8	10	10	12	7	2	3								79	24.7	4.83
Feb., 1978	30	13	27	13	14	7	8	6	4	4	-	1	1	-	1	1	130	25.1	6.30
Mar., 1978	20	11	10	13	8	16	8	7	2	1	1	-	1				98	25.7	5.28
Apr., 1978		1	10	15	14	10	7	1	4	1	1	1	-	-	-	1	66	28.1	4.74
May, 1978				1	5	9	14	17	6	6	2	-	-	-	1		61	32.2	3.68
June, 1978	83	23	6	-	-	3	5	8	5	3	1	6	-	1			144	22.9	6.92
July, 1978	3	20	38	42	34	11	2	-	1	3	1	2					157	25.1	3.70
Aug., 1978	2	8	7	8	27	35	18	6	1	2	4	4	7				129	29.4	5.[illegible]
Sep., 1978	22	6	4	4	2	13	6	6	4	3	13	6	3	-	1		93	29.3	8.36
Oct., 1978	3	5	3	5	8	9	14	7	9	1	1	6	-	1			72	30.3	5.93
Nov., 1978	-	1	3	2	3	2	4	15	21	15	18	29	28	14	5	2	162	38.5	5.39
Dec., 1978	7	13	29	24	19	5	5	16	16	8	5	3	2				152	28.0	6.01

Table 94. Standard length frequency distribution for pregnant *Poecilia latipinna* in monthly samples from three study stations.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	X̄	s
Station 1																			
Oct., 1976					2	-	-	-	1								3	29.5	5.17
Nov., 1976																	0	-	-
Apr., 1977					2	2	-	-	1								5	29.1	3.02
May, 1977	-	1	1	18	8	8	1										37	26.1	2.03
June, 1977	-	-	-	-	4	22	24	16	14	9	4						93	32.1	3.01
July, 1977	-	-	-	-	-	-	1	2	2	1							6	34.0	1.61
Aug., 1977	-	-	-	-	1	5	6	6	7	3							28	32.4	2.80
Sept.,1977	1	-	3	8	3	1	4	4	4	2							30	28.8	4.80
Oct., 1977				1	3	7	4	11	9	9	1						45	32.8	3.42
Station 2																			
Oct., 1976					1	-	-	-	1								2	31.2	5.30
Nov., 1976																	0	-	-
Apr., 1977					4	5	8	10	-	1							28	30.8	2.23
May, 1977	-	-	1	15	34	19	11	15	-	1							96	28.4	2.83
June, 1977	-	-	-	-	-	5	1	2									8	30.2	1.81
July, 1977	-	-	-	-	-	-	4	2	3	1							10	33.3	2.38
Aug., 1977	-	-	-	2	8	15	9	8	6	5	3	1					57	31.4	3.82
Sept.,1977	-	3	15	13	13	3	3	2	3								55	26.0	3.54
Oct., 1977			1	4	2	2	4	6	2	1	1						23	30.4	4.14
Station 3																			
Oct., 1976							1	-	1								2	32.9	3.04
Nov., 1976				1	-	-	-	1	-	1	-	-	1				4	34.9	7.55
Apr., 1977													1	1	1		3	44.5	1.62
May, 1977	-	-	-	-	2	-	12	3	2	3							22	32.3	2.72
June, 1977	-	-	-	-	-	-	-	1	1	-	3	2	1				8	39.5	2.10
July, 1977	-	-	-	-	-	-	-	-	-	1	1						2	37.7	1.41
Aug., 1977	-	-	-	-	-	-	7	5									12	31.8	1.12
Sept.,1977	-	-	1	3	11	12	7	9	7	7	10	4	2	1	1		75	33.3	5.50
Oct., 1977			1	3	2	7	7	6	2	8	7	8	2	2			55	34.6	5.75
Nov., 1977	1	-	-	-	-	-	-	2	2	1	-	1	1				8*	34.5	7.05

*Only 3 of 8 pregnant females carried normal broods. Five broods had unusually high percentages of abnormal embryos or unfertilized eggs.

Table 95. Standard length frequency distribution for pregnant *Poecilia latipinna* in monthly samples from three study stations, 1978.

	18-19	20-21	22-23	24-25	26-27	28-29	30-31	32-33	34-35	36-37	38-39	40-41	42-43	44-45	46-47	48-49	N	X̄	S
Station 1																			
Apr., 1978				1	3	9	5	5	5	4	1						33	31.7	3.58
May, 1978			1	5	10	6	1	1	1								25	27.5	2.35
June, 1978				2	9	11	1	3	1	-	1						28	29.4	3.10
July, 1978				10	14	27	5	1									57	26.0	1.74
Aug., 1978					11	30	20	10	7	3							81	30.4	2.44
Sep., 1978			1	1	8	17	22	14	9	1	2						75	31.1	3.01
Oct., 1978		1	1	1	8	6	8	1	1	1							28	29.0	3.22
Nov., 1978					1	-	-	3									4	31.6	2.64
Station 2																			
Apr., 1978					3	6	5	5	2	2	4						27	32.4	3.80
May, 1978			1	5	5	7	12	18	16	11	5	2	1	1	1		85	33.2	4.56
June, 1978					4	13	31	20	13	4	3	1					89	32.1	2.68
July, 1978						1	[illegible]	3	11	13	9	3	-	1			46	36.1	3.22
Aug., 1978					2	6	[illegible]	11	10	10	4	4	1				57	34.2	3.70
Sep., 1978				2	3	8	6	4	4	2	2	2					33	31.9	4.27
Oct., 1978			1	1	3	7	-	2	2	2	1						19	30.4	4.52
Nov., 1978																	0	-	-
Station 3																			
Apr., 1978					1	6	6	13	14	21	10	7	5	-	2		85	36.1	4.05
May, 1978					6	7	8	9	14	17	22	10	4	1	1	1	100	36.0	4.57
June, 1978							7	2	1	1	4	3	1				19	35.7	4.41
July, 1978											1	-	1				2	40.8	2.90
Aug., 1978						1	5	3	2	1	1	7	1	1			22	36.3	4.80
Sep., 1978				1	2	8	10	8	5	5	9	6	2	2	2	1	61	35.3	5.73
Oct., 1978				1	1	8	8	21	14	10	4	3	3	1			74	34.3	3.90
Nov., 1978										1	-	-	1	2			4	42.4	4.12

Table 96. The mean number of normal embryos in broods of pregnant females from three study areas, 1977 and 1978.

	VABI			TOWY			BCHRD		
	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N
Apr., 1977	15.0	6.75	5	10.2	3.18	28	35.0	7.00	3
May, 1977	4.6	1.80	37	7.7	3.79	96	13.9	3.53	22
June, 1977	17.2	9.64	93	11.4	3.11	8	25.5	12.25	8
July, 1977	10.0	2.97	6	13.3	4.30	10	26.0	0.0	2
Aug., 1977	11.6	3.05	28	10.4	4.41	57	12.2	4.99	12
Sep., 1977	12.5	7.81	30	6.1	3.35	55	16.4	8.25	75
Oct., 1977	20.8	9.64	45	6.0	3.23	23	12.9	7.75	55
Apr., 1978	14.5	5.71	33	17.1	8.17	27	21.5	7.46	84
May, 1978	6.7	1.49	25	10.8	5.22	85	21.8	8.64	100
June, 1978	15.5	13.05	28	10.1	4.03	89	17.3	8.68	19
July, 1978	8.3	2.18	57	13.3	5.08	46	14.5	0.71	2
Aug., 1978	7.8	2.86	81	13.6	5.29	57	14.3	6.55	22
Sep., 1978	10.0	3.54	75	11.5	6.70	33	13.6	6.77	61
Oct., 1978	5.7	2.52	28	9.4	5.14	19	14.0	6.97	74
Nov., 1978	5.2	4.73	4	-	-	-	14.2	3.54	4

Table 97. The mean number of normal embryos in broods of pregnant females 28.0-33.9 mm SL from three study areas, 1977 and 1978.

	VABI		TOWY		BCHRD	
	$\bar{X}$	N	$\bar{X}$	N	$\bar{X}$	N
Apr., 1977	19.0	2	10.6	23	-	-
May, 1977	6.6	9	9.8	45	13.5	15
June, 1977	15.0	62	11.4	8	-	-
July, 1977	9.0	3	11.0	6	-	-
Aug., 1977	11.4	17	8.9	32	12.2	12
Sep., 1977	14.9	9	10.1	8	12.2	28
Oct., 1977	7.6	22	6.8	12	8.2	20
Apr., 1978	13.2	19	13.5	16	14.9	25
May, 1978	7.4	8	8.6	37	12.8	24
June, 1978	16.5	15	9.2	64	9.9	9
July, 1978	9.0	33	9.4	9	-	-
Aug., 1978	7.6	60	12.0	26	9.89	9
Sep., 1978	9.7	53	11.28	18	9.38	26
Oct., 1978	6.1	15	7.33	9	10.35	37
Nov., 1978	6.67	3	-	-	-	-

Table 98. Statistical data for linear regressions of brood size on female size for each monthly sample of <u>Poecilia Latipinna</u> at three study areas in 1977.

		Slope	Intercept	Coefficient of Determination	Significance	N
Station 1 (VABI)						
	April	1.36	- 22.62	0.48	0.00144	16
	May	0.45	- 6.63	0.28	0.00004	50
	June	1.97	- 45.53	0.36	0.00001	99
	July	0.49	- 5.35	0.09	0.11547	18
	August	0.78	- 13.10	0.37	0.00001	45
	September	1.35	- 23.64	0.58	0.00001	59
	October	2.00	- 45.71	0.50	0.00001	53
Station 2 (TOWY)						
	April	0.74	- 13.21	0.30	0.00001	58
	May	0.92	- 18.35	0.55	0.00001	114
	June	0.26	3.95	0.02	0.36038	9
	July	0.87	- 14.81	0.38	0.00097	22
	August	0.80	- 14.68	0.49	0.00001	64
	September	0.72	- 12.97	0.53	0.00001	70
	October	0.53	- 10.03	0.46	0.00020	23
Station 3 (BCHRD)						
	April	2.40	- 72.03	0.96	0.00005	7
	May	1.00	- 19.22	0.45	0.00003	30
	June	5.74	-197.12	0.44	0.01814	10
	July	0.09	20.40	0.01	0.45928	11
	August	0.77	- 9.93	0.16	0.02446	25
	September	1.28	- 25.87	0.74	0.00001	115
	October	0.86	- 16.94	0.44	0.00001	58

Table 99. . Statistical data for linear regressions of brood size on female size for each monthly sample of Poecilia Latipinna at three study areas in 1978.

		Slope	Intercept	Coefficient of Determination	Significance	N
Station 1 (VABI)						
	April	1.10	-20.25	0.55	0.00000	43
	May	0.35	- 3.03	0.33	0.00050	33
	June	2.10	-46.33	0.33	0.00001	55
	July	0.69	-11.13	0.31	0.00001	57
	August	0.64	-11.02	0.27	0.00000	122
	September	0.73	-12.59	0.38	0.00000	79
	October	0.59	-11.51	0.55	0.00000	30
Station 2 (TOWY)						
	April	1.59	-34.37	0.74	0.00000	45
	May	0.84	-16.95	0.60	0.00000	99
	June	0.83	-16.65	0.33	0.00000	118
	July	1.03	-24.06	0.44	0.00000	63
	August	0.63	- 7.96	0.23	0.00004	68
	September	0.88	-16.48	0.33	0.00027	36
	October	0.92	-18.54	0.66	0.00003	19
Station 3 (BCHRD)						
	April	1.43	-29.72	0.75	0.00000	108
	May	1.64	-37.61	0.75	0.00000	111
	June	1.45	-35.42	0.52	0.00007	24
	July	--	--	--	--	3
	August	0.93	-18.31	0.57	0.00000	41
	September	0.95	-19.92	0.68	0.00000	67
	October	1.24	-28.75	0.53	0.00000	82

Table 100. Statistical data for linear regressions of brood size on female size for monthly and pooled samples of *Poecilia latipinna* at three study areas in 1977. These data correspond to the graph lines shown in text Figure 12.

	Slope	Intercept	Coefficient of Determination	N
Station 1 (VABI)				
August	0.78	-13.10	0.67	45
Pooled (Apr., May, Jun., Sep., Oct.)	1.60	-32.99	0.73	227
Station 2 (TOWY)				
October	0.53	-10.03	0.68	23
Pooled (Apr., May, Jul., Aug., Sep.)	0.86	-16.36	0.76	328
Station 3 (SCHRD)				
Pooled (May, Jun., Aug., Sep., Oct.)	1.18	-24.04	0.70	238

Table 101. Statistical data for linear regressions of brood size on female size for monthly and pooled samples of *Poecilia latipinna* at three study areas in 1978. These data correspond to the graph lines shown in text Figure 13.

	Slope	Intercept	Coefficient of Determination	N
Station 1 (VABI)				
June	2.10	-46.33	0.57	55
October	0.59	-11.51	0.74	30
Pooled (Apr., May, Jul., Aug., Sep.)	0.79	-14.35	0.61	334
Station 2 (TOWY)				
July	1.03	-24.06	0.67	63
Pooled (Apr., May, Jun., Aug., Sep., Oct.)	0.85	-16.08	0.62	385
Station 3 (BCHRD)				
Pooled (Apr., May, Jun., Aug., Sep., Oct.)	1.32	-28.86	0.75	433

Table 102. Summary of Environmental Parameters at the VAB Study Station (Station 1).

Parameter	October 1976	November 1976	December 1976	January 1977	February 1977	March 1977	April 1977
Water Temperature	23.0°C	21.0°C	15.0°C	17.0°C	14.0°C	18.0°C	15.0°C
Monthly Water Temperature							
Average Daily Min.	-	19.0°C	19.0°C	16.0°C	12.0°C	15.0°C	21.0°C
Average Daily Max.	-	22.0°C	20.0°C	17.0°C	14.0°C	18.0°C	25.0°C
Average Daily Median	-	21.0°C	19.0°C	17.0°C	13.0°C	17.0°C	23.0°C
Salinity	9.0 ppt	9.5 ppt	8.0 ppt	7.0 ppt	7.0 ppt	7.0 ppt	9.0 ppt
Water Level Change	0	-4 cm	+4 cm	0 cm	-4 cm	-8 cm	-14 cm
Turbidity	0.73 NTU	1.20 NTU	0.75 NTU	2.0 NTU	20.0 NTU	16.0 NTU	6.8 NTU
Dissolved Oxygen	-	-	-	-	8.3 ppm	7.5 ppm	4.2 ppm
pH	9.4	9.3	8.9	9.0	8.9	8.3	8.5
Ortho-phosphate	-	0.034 mg/1	0.052 mg/1	0.007 mg/1	0.136 mg/1	0.091 mg/1	0.092 mg/1
Nitrate Nitrogen	-	0.049 mg/1	0.067 mg/1	0.072 mg/1	0.183 mg/1	..180 mg/1	0.240 mg/1
Total Chlorophyll							
periphyton	-	0.0082mg/cm^2/day[a]	0.0004mg/cm^2/day[b]	0.0002mg/cm^2/day[b]	0.0021mg/cm^2/day[c]	0.0015mg/cm^2/day[a]	0.0011mg/cm^2/day[a]
phytoplankton	-	1.388 mg/m^3	5.136 mg/m^3	0.821 mg/m^3	12.253 mg/m^3	6.178 mg/m^3	2.438 mg/m^3

[a] Mean of four samples

[b] Mean of three samples

[c] One sample

Table 103. Summary of Environmental Parameters at the VAB Study Station (Station 1). The July periphyton chlorophyll mean is based on three determinations, not four. Blanks in the data resulted from equipment failures.

Parameter	May 1977	June 1977	July 1977	August 1977	September 1977
Water Temperature	24.0°C	30.0°C	30.0°C	32.0°C	29.0°C
Monthly Water Temperature					
Average Daily Min.	22.0°C	24.0°C	28.0°C	30.0°C	28.0°C
Average Daily Max.	28.0°C	28.0°C	32.0°C	32.0°C	30.0°C
Average Daily Median	24.0°C	26.0°C	30.0°C	31.0°C	29.0°C
Salinity	10.0 ppt	35.0 ppt	28.0 ppt	29.0 ppt	30.0 ppt
Water Level Change	-18 cm	+48 cm	-6 cm	-12 cm	+42 cm
Turbidity	23.0 NTU	4.8 NTU	4.3 NTU	7.9 NTU	3.2 NTU
Dissolved Oxygen	2.3 ppm	2.5 ppm	2.2 ppm	7.9 ppm	3.4 ppm
pH	8.1	----	----	8.0	7.3
Ortho-phosphate	0.088 mg/1	0.053 mg/1	0.048 mg/1	0.175 mg/1	0.201 mg/1
Nitrate Nitrogen	----	0.235 mg/1	----	0.065 mg/1	0.119 mg/1
Total Chlorophyll					
Periphyton*	0.0025mg/cm^2/day	0.0014mg/cm^2/day	0.0026mg/cm^2/day	0.0063mg/cm^2/day	0.0018mg/cm^2/day
Phytoplankton	5.916 mg/m^3	1.304 mg/m^3	0.761 mg/m^3	21.628 mg/m^3	2.980 mg/m^3

* Mean of four determinations

Table 104. Summary of Environmental Parameters at the VAB Study Station (Station 1). Blanks in the data resulted from equipment failures.

Parameter	Oct. 1977	Nov. 1977	Dec. 1977	Jan. 1978	Feb. 1978	Mar. 1978
Water Temperature	25.0°C	26.0°C	20.0°C	17.0°C	14.0°C	18.0°C
Monthly Water Temperature						
Average Daily Min.	26.0°C	22.0°C	20.0°C	12.0°C	12.0°C	13.0°C
Average Daily Max.	30.0°C	26.0°C	22.0°C	14.0°C	14.0°C	15.0°C
Average Daily Median	28.0°C	24.0°C	21.0°C	13.0°C	13.0°C	14.0°C
Salinity	28.0 ppt	30.0 ppt	19.0 ppt	21.0 ppt	38.0 ppt	15.0 ppt
Water Level Change	---	---	-14 cm	0 cm	-4 cm	+5 cm
Turbidity	2.5 NTU	15.0 NTU	1.9 NTU	1.3 NTU	1.1 NTU	1.2 NTU
Dissolved Oxygen	4.0 ppm	5.2 ppm	5.8 ppm	9.2 ppm	9.2 ppm	7.2 ppm
pH	8.6	8.2	7.6	8.0	8.2	7.8
Ortho-phosphate	0.070 mg/1	0.092 mg/1	0.014 mg/1	0.070 mg/1	0.052 mg/1	0.023 mg/1
Nitrate Nitrogen	0.088 mg/1	0.108 mg/1	0.042 mg/1	0.082 mg/1	0.001 mg/1	0.092 mg/1
Total Chlorophyll						
Periphyton*	0.0012 mg/cm^2/day	0.0015 mg/cm^2/day	0.0010 mg/cm^2/day	0.0005 mg/cm^2/day	0.0004 mg/cm^2/day	0.0008 mg/cm^2/day
Phytoplankton	---	2.565mg/m^3	1.697mg/m^3	0 mg/m^3	1.804mg/m^3	1.812mg/m^3

* Mean of four determinations

Table 105. Summary of Environmental Parameters of the VAB Study Station (Station 1).

Parameter	Apr. 1978	May 1978	June 1978	July 1978
Water Temperature	25.0°C	27.0°C	30.5°C	32.0°C
Monthly Water Temperature				
Average Daily Min.	19.0°C	23.0°C	28.0°C	-
Average Daily Max.	23.0°C	28.0°C	33.0°C	-
Average Daily Median	21.0°C	26.0°C	31.0°C	-
Salinity	15.0 ppt	21.0 ppt	18.0 ppt	17.0 ppt
Water Level Change	-13 cm	-18 cm	+16 cm	-4 cm
Turbidity	4.1 NTU	5.7 NTU	1.7 NTU	1.8 NTU
Dissolved Oxygen	3.2 ppm	1.5 ppm	6.8 ppm	2.6 ppm
pH	8.0	8.1	8.6	8.7
Ortho-phosphate	0.003 mg/1	0.032 mg/1	0.261 mg/1	0.000 mg/1
Nitrate Nitrogen	0.026 mg/1	0.000 mg/1	0.000 mg/1	0.000 mg/1
Total Chlorophyll				
Periphyton*	0.0007 mg/ cm^2/day	0.0022 mg/ cm^2/day	0.0019 mg/ cm^2/day	0.0009 mg/ cm^2/day
Phytoplankton	1.604 mg/m^3	0.750 mg/m^3	6.308 mg/m^3	1.686 mg/m^3

*Mean of four determinations.

Table 106. Summary of Environmental Parameters at the VAB Study Station (Station 1). Blanks in the data resulted from equipment failures.

Parameter	Aug. 1978	Sept. 1978	Oct. 1978	Nov. 1978	Dec. 1978
Water Temperature	30.0°C	31.0°C	27.0°C	23.0°C	23.0°C
Monthly Water Temperature					
Average Daily Min.	28.0°C	28.0°C	28.0°C	24.0°C	22.0°C
Average Daily Max.	32.0°C	32.0°C	32.0°C	27.0°C	24.0°C
Average Daily Median	30.0°C	30.0°C	30.0°C	25.0°C	23.0°C
Salinity	12.5 ppt	13.0 ppt	14.0 ppt	12.0 ppt	12.0 ppt
Water Level Change	+12 cm	-14 cm	- 2 cm	+ 4 cm	- 4 cm
Turbidity	1.0 NTU	1.5 NTU	1.2 NTU	2.8 NTU	2.4 NTU
Dissolved Oxygen	4.8 ppm	2.0 ppm	4.4 ppm	8.1 ppm	3.6 ppm
pH	8.8	8.5	8.6	8.4	8.4
Ortho-Phosphate	0.011 mg/1	0.007 mg/1	0.048 mg/1	0.011 mg/1	0.044 mg/1
Nitrate Nitrogen	0 mg/1	0 mg/1	-	0.021 mg/1	0.027 mg/1
Total Chlorophyll Periphyton*	0.0008 mg/ cm^2/day	0.0008 mg/ cm^2/day	0.0010 mg/ cm^2/day	0.0005 mg/ cm^2/day	0.0007 mg/ cm^2/day
Phytoplankton	1.069 mg/m^3	0.901 mg/m^3	2.321 mg/m^3	0.016 mg/m^3	0.400 mg/m^3

* Mean of four determinations

Table 107. Summary of Environmental Parameters at the Tow-way Study Station (Station 2).

Parameter	October 1976	November 1976	December 1976	January 1977	February 1977	March 1977	April 1977
Water Temperature	23.0°C	20.0°C	15.0°C	16.5°C	16.0°C	18.0°C	22.0°C
Monthly Water Temperature							
Average Daily Min.	-	-	-	-	12.0°C	16.0°C	22.0°C
Average Daily Max.	-	-	-	-	14.0°C	19.0°C	24.0°C
Average Daily Median	-	-	-	-	13.0°C	17.0°C	23.0°C
Salinity	3.0 ppt	3.0 ppt	3.0 ppt	4.0 ppt	2.5 ppt	2.5 ppt	3.0 ppt
Water Level Change	0	-2 cm	+4 cm	0 cm	0 cm	-6 cm	-10 cm
Turbidity	1.0 NTU	1.7 NTU	1.3 NTU	1.4 NTU	1.4 NTU	1.8 NTU	2.0 NTU
Dissolved Oxygen	-	-	-	-	8.3 ppm	6.2 ppm	5.8 ppm
pH	8.4	8.2	8.1	8.9	8.4	8.0	8.6
Ortho-phosphate	-	0.050 mg/l	0.079 mg/l	0.021 mg/l	0.145 mg/l	0.350 mg/l	0.092 mg/l
Nitrate Nitrogen	-	0.054 mg/l	0.051 mg/l	0.098 mg/l	0.180 mg/l	0.183 mg/l	0.292 mg/l
Total Chlorophyll							
periphyton	-	0.0143 mg/cm²/day[a]	0.0121 mg/cm²/day[b]	0.0115 mg/cm²/day[c]	0.0026 mg/cm²/day[c]	0.0021 mg/cm²/day[c]	0.0132 mg/cm²/day
phytoplankton	-	0.558 mg/m³	1.712 mg/m³	1.270 mg/m³	9.273 mg/m³	0.676 mg/m³	0.411 mg/m³

[a] Mean of four samples

[b] Mean of three samples

[c] Mean of two samples

Table 108. Summary of Environmental Parameters at the Tow-way Study Station (Station 2). Blanks in the data resulted from equipment failures.

Parameter	May 1977	June 1977	July 1977	August 1977	September 1977
Water Temperature	25.0°C	26.0°C	30.0°C	32.0°C	29.0°C
Monthly Water Temperature					
Average Daily Min.	24.0°C	--	--	--	28.0°C
Average Daily Max.	29.0°C	--	--	--	32.0°C
Average Daily Median	26.0°C	--	--	--	30.0°C
Salinity	3.0 ppt	5.0 ppt	2.5 ppt	6.0 ppt	7.0 ppt
Water Level Change	-24 cm	+16 cm	+12 cm	-8 cm	+42 cm
Turbidity	2.0 NTU	10.0 NTU	2.2 NTU	4.1 NTU	2.3 NTU
Dissolved Oxygen	4.1 ppm	5.3 ppm	4.0 ppm	3.6 ppm	7.2 ppm
pH	8.7	--	--	8.4	7.8
Ortho-phosphate	0.442 mg/l	0.171 mg/l	0.048 mg/l	0.306 mg/l	0.062 mg/l
Nitrate Nitrogen	--	0.237 mg/l	--	0.062 mg/l	0.122 mg/l
Total Chlorophyll					
Periphyton*	0.0023mg/cm^2/day	0.0010mg/cm^2/day	0.0010mg/cm^2/day	0.0011mg/cm^2/day	0.0011mg/cm^2/day
Phytoplankton	0.835 mg/m^3	2.525 mg/m^3	3.132 mg/m^3	0.916 mg/m^3	2.390 mg/m^3

* Mean of four determinations

Table 109. Summary of Environmental Parameters at the Tow-way Study Station (Station 2). Blanks in the data resulted from equipment failures.

Parameter	Oct. 1977	Nov. 1977	Dec. 1977	Jan. 1978	Feb. 1978	Mar. 1978
Water Temperature	25.0°C	24.0°C	20.0°C	18.0°C	7.0°C	18.0°C
Monthly Water Temperature						
Average Daily Min.	28.0°C	23.0°C	20.0°C	16.0°C	13.0°C	14.0°C
Average Daily Max.	32.0°C	26.0°C	23.0°C	18.0°C	16.0°C	17.0°C
Average Daily Median	30.0°C	25.0°C	22.0°C	17.0°C	15.0°C	15.0°C
Salinity	10.0 ppt	12.0 ppt	7.0 ppt	6.0 ppt	7.0 ppt	2.5 ppt
Water Level Change	---	---	-8 cm	-8 cm	-4 cm	+8 cm
Turbidity	2.8 NTU	3.2 NTU	12.0 NTU	1.4 NTU	2.3 NTU	1.0 NTU
Dissolved Oxygen	6.1 ppm	7.2 ppm	4.6 ppm	8.5 ppm	10.3 ppm	8.0 ppm
pH	9.2	7.9	7.7	7.9	8.3	8.2
Ortho-Phosphate	0.145 mg/l	0.083 mg/l	0.057 mg/l	0.092 mg/l	0.093 mg/l	0.011 mg/l
Nitrate Nitrogen	0.079 mg/l	0.119 mg/l	0.096 mg/l	0.148 mg/l	0.023 mg/l	0.145 mg/l
Total Chlorophyll						
Periphyton	0.0043 mg/cm^2/day[a]	0.0016 mg/cm^2/day[b]	0.0010 mg/cm^2/day[a]	0.0035 mg/cm^2/day[a]	0.0031 mg/cm^2/day[c]	0.0034 mg/cm^2/day[a]
Phytoplankton	---	2.917mg/m^3	2.733mg/m^3	2.014mg/m^3	2.514mg/m^3	1.783mg/m^3

[a] mean of four determinations
[b] mean of three determinations
[c] mean of two determinations

Table 110. Summary of Environmental Parameters at the Tow-way Study Station (Station 2).

Parameters	Apr. 1978	May 1978	June 1978	July 1978
Water Temperature	25.0°C	28.0°C	30.0°C	30.0°C
Monthly Water Temperature				
Average Daily Min.	21.0°C	24.0°C	29.0°C	28.0°C
Average Daily Max.	24.0°C	27.0°C	31.0°C	31.0°C
Average Daily Median	22.0°C	26.0°C	30.0°C	30.0°C
Salinity	2.0 ppt	4.5 ppt	5.5 ppt	3.0 ppt
Water Level Change	-10 cm	-14 cm	+22 cm	+6 cm
Turbidity	2.8 NTU	3.8 NTU	1.9 NTU	1.1 NTU
Dissolved Oxygen	4.9 ppm	2.4 ppm	2.1 ppm	1.6 ppm
pH	7.8	8.0	7.9	7.8
Ortho-phosphate	0.000 mg/1	0.052 mg/1	0.294 mg/1	0.052 mg/1
Nitrate Nitrogen	0.071 mg/1	0.018 mg/1	0.097 mg/1	0.000 mg/1
Total Chlorophyll				
Periphyton*	0.0019 mg/ cm^2/day	0.0081 mg/ cm^2/day	0.0052 mg/ cm^2/day	0.0036 mg/ cm^2/day
Phytoplankton	3.622 mg/m^3	3.454 mg/m^3	2.520 mg/m^3	1.510 mg/m^3

*Mean of four determinations.

Table 111. Summary of Environmental Parameters at the Tow-way Study Station (Station 2). Blanks in the data resulted from equipment failures.

Parameters	Aug. 1978	Sept. 1978	Oct. 1978	Nov. 1978	Dec. 1978
Water Temperature	30.0°C	29.0°C	26.5°C	23.0°C	24.0°C
Monthly Water Temperature					
Average Daily Min.	-	-	29.0°C	22.0°C	23.0°C
Average Daily Max.	-	-	31.0°C	24.0°C	24.0°C
Average Daily Median	-	-	30.0°C	23.0°C	24.0°C
Salinity	1.0 ppt	0 ppt	0 ppt	1.5 ppt	0 ppt
Water Level change	+13 cm	-27 cm	+ 5 cm	+ 8 cm	- 9 cm
Turbidity	1.8 NTU	2.8 NTU	0.9 NTU	0.8 NTU	2.0 NTU
Dissolved Oxygen	0.5 ppm	2.5 ppm	3.0 ppm	-	6.9 ppm
pH	7.7	7.8	7.9	9.4	8.0
Ortho-Phosphate	0.126 mg/1	0.011 mg/1	0.113 mg/1	0.015 mg/1	0.003 mg/1
Nitrate Nitrogen	0.021 mg/1	0.033 mg/1	-	0.071 mg/1	[illegible]5 mg/1
Total Chlorophyll Periphyton*	0.0030 mg/ cm^2/day	0.0024 mg/ cm^2/day	0.0044 mg/ cm^2/day	0.0027 mg/ cm^2/day	0.0048 mg/ cm^2/day
Phytoplankton	6.574 mg/m^3	10.908 mg/m^3	3.351 mg/m^3	2.543 mg/m^3	2.002 mg/m^3

* Mean of four determinations

Table 112. Summary of Environmental Parameters at the Beach Road Study Station (Station 3).

Parameter	October 1976	November 1976	December 1976	January 1977	February 1977	March 1977	April 1977
Water Temperature	23.0°C	19.0°C	16.0°C	17.5°C	15.0°C	17.0°C	23.0°C
Monthly Water Temperature							
Average Daily Min.	-	20.0°C	19.0°C	16.0°C	12.0°C	16.0°C	20.0°C
Average Daily Max.	-	23.0°C	21.0°C	13.0°C	15.0°C	18.0°C	26.0°C
Average Daily Median	-	22.0°C	20.0°C	17.0°C	14.0°C	17.0°C	24.0°C
Salinity	30.0 ppt	23.5 ppt	26.0 ppt	22.0 ppt	24.0 ppt	22.0 ppt	28.0 ppt
Water Level Change	0	-2 cm	+8 cm	+6 cm	-2 cm	-4 cm	-38 cm
Turbidity	9.0 NTU	8.9 NTU	7.8 NTU	13.0 NTU	15.0 NTU	17.0 NTU	42.0 NTU
Dissolved Oxygen	-	-	-	-	10.0 ppm	6.0 ppm	4.0 ppm
pH	9.0	8.3	7.9	8.6	9.1	8.4	8.6
Ortho-phosphate	-	0.021 mg/l	0.011 mg/l	0.014 mg/l	0.097 mg/l	0.175 mg/l	0.350 mg/l
Nitrate Nitrogen	-	0.049 mg/l	0.065 mg/l	0.080 mg/l	0.165 mg/l	0.194 mg/l	0.310 mg/l
Total Chlorophyll							
periphyton	-	0.0101mg/cm^2/day[a]	0.0015mg/cm^2/day[a]	0.0006mg/cm^2/day[b]	0.0049mg/cm^2/day[c]	0.0009mg/cm^2/day[a]	0.0008mg/cm^2/day[a]
phytoplankton	-	8.271 mg/m^3	10.677 mg/m^3	2.562 mg/m^3	13.831 mg/m^3	5.971 mg/m^3	5.580 mg/m^3

[a] Mean of four samples

Table 113. Summary of Environmental Parameters at the Beach Road Study Station (Station 3). Blanks in the data resulted from equipment failures.

Parameter	May 1977	June 1977	July 1977	August 1977	September 1977
Water Temperature	21.5°C	29.0°C	26.0°C	30.0°C	30.0°C
Monthly Water Temperature					
Average Daily Min.	20.0°C	21.0°C	28.0°C	29.0°C	28.0°C
Average Daily Max.	31.0°C	34.0°C	34.0°C	35.0°C	33.0°C
Average Daily Median	25.0°C	28.0°C	32.0°C	32.0°C	30.0°C
Salinity	20.5 ppt	35.0 ppt	27.0 ppt	35.0 ppt	33.0 ppt
Water Level Change	-12 cm	+22 cm	+2 cm	+2 cm	+14 cm
Turbidity	48.0 NTU	42.0 NTU	14.0 NTU	24.0 NTU	10.1 NTU
Dissolved Oxygen	0.3 ppm	2.6 ppm	1.9 ppm	3.8 ppm	4.2 ppm
pH	7.5	--	--	8.7	8.0
Ortho-phosphate	0.354 mg/1	0.131 mg/1	0.070 mg/1	0.136 mg/1	0.180 mg/1
Nitrate Nitrogen	--	0.263 mg/1	--	0.065 mg/1	0.062 mg/1
Total Chlorophyll					
Periphyton*	0.0016mg/cm^2/day	0.0017mg/cm^2/day	0.0019mg/cm^2/day	0.0020mg/cm^2/day	0.0010mg/cm^2/day
Phytoplankton	12.935 mg/m^3	6.667 mg/m^3	4.223 mg/m^3	2.589 mg/m^3	3.383 mg/m^3

* Mean of four determinations

Table 114. Summary of Environmental Parameters at the Beach Road Study Station (Station 3). Blanks in the data resulted from equipment failures.

Parameter	Oct. 1977	Nov. 1977	Dec. 1977	Jan. 1978	Feb. 1978	Mar. 1978
Water Temperature	24.0°C	24.5°C	19.0°C	19.0°C	6.5°C	17.0°C
Monthly Water Temperature						
Average Daily Min.	29.0°C	21.0°C	20.0°C	16.0°C	11.0°C	13.0°C
Average Daily Max.	32.0°C	26.0°C	22.0°C	19.0°C	14.0°C	16.0°C
Average Daily Median	30.0°C	24.0°C	21.0°C	18.0°C	13.0°C	14.0°C
Salinity	40.0 ppt	38.5 ppt	27.0 ppt	28.0 ppt	29.0 ppt	16.0 ppt
Water Level Change	---	---	+4 cm	+4 cm	+2 cm	-6 cm
Turbidity	18.0 NTU	3.3 NTU	1.7 NTU	19.0 NTU	9.5 NTU	9.3 NTU
Dissolved Oxygen	4.8 ppm	4.6 ppm	4.2 ppm	3.4 ppm	9.4 ppm	3.6 ppm
pH	9.0	8.3	7.4	8.0	8.3	8.4
Ortho-Phosphate	0.385 mg/l	0.140 mg/l	0.140 mg/l	0.101 mg/l	0.011 mg/l	0.044 mg/l
Nitrate Nitrogen	0.093 mg/l	0.062 mg/l	0.050 mg/l	0.062 mg/l	0.002 mg/l	0.094 mg/l
Total Chlorophyll						
Periphyton*	0.0008 mg/ cm^2/day	0.0021 mg/ cm^2/day	0.0029 mg/ cm^2/day	0.0028 mg/ cm^2/day	0.0015 mg/ cm^2/day	0.0030 mg/ cm^2/day
Phytoplankton	---	1.755mg/m^3	3.661mg/m^3	5.653mg/m^3	1.819mg/m^3	3.498mg/m^3

* Mean of four determinations

Table 115. Summary of Environmental Parameters at the Beach Road Station (Station 3).

Parameters	Apr. 1978	May 1978	June 1978	July 1978
Water Temperature	25.0°C	27.5°C	30.0°C	31.0°C
Monthly Water Temperature				
Average Daily Min.	20.0°C	21.0°C	23.0°C	-
Average Daily Max.	24.0°C	29.0°C	34.0°C	-
Average Daily Median	22.0°C	25.0°C	28.0°C	-
Salinity	18.0 ppt	20.0 ppt	26.0 ppt	23.0 ppt
Water Level Change	-8 cm	-16 cm	+6 cm	+11 cm
Turbidity	13.0 NTU	28.0 NTU	15.0 NTU	13.0 NTU
Dissolved Oxygen	3.8 ppm	1.9 ppm	3.8 ppm	2.8 ppm
pH	8.4	8.0	8.8	8.6
Ortho-phosphate	0.011 mg/1	0.097 mg/1	0.261 mg/1	0.093 mg/1
Nitrate Nitrogen	0.033 mg/1	0.018 mg/1	0.000 mg/1	0.000 mg/1
Total Chlorophyll				
Periphyton*	0.0022 mg/ cm^2/day	0.0020 mg/ cm^2/day	0.0020 mg/ cm^2/day	0.0048 mg/ cm^2/day
Phytoplankton	3.910 mg/m^3	2.578 mg/m^3	10.474 mg/m^3	2.563 mg/m^3

*Mean of four determinations.

Table 116. Summary of Environmental Parameters at the Beach Road Study Station (Station 3). Blanks in the data resulted from equipment failures.

Parameters	Aug. 1978	Sept. 1978	Oct. 1978	Nov. 1978	Dec. 1978
Water Temperature	29.0°C	28.[illegible]°C	25.5°C	25.0°C	24.0°C
Monthly Water Temperature					
Average Daily Min.	-	-	24°C	-	-
Average Daily Max.	-	-	30°C	-	-
Average Daily Median	-	-	27°C	-	-
Salinity	19.5 ppt	20.0 ppt	22.0 ppt	26.[illegible] ppt	25.0 ppt
Water Level Change	+8 cm	-6 cm	-8 cm	+12 cm	-6 cm
Turbidity	17.0 NTU	18.0 NTU	1.3 NTU	2.8 NTU	1.5 NTU
Dissolved Oxygen	3.2 ppm	4.1 ppm	3.8 ppm	7.8 ppm	5.2 ppm
pH	8.4	8.4	8.1	8.3	9.5
Ortho-Phosphate	0.089 mg/1	0.011 mg/1	0.052 mg/1	0.003 mg/1	0.011 mg/1
Nitrate Nitrogen	0 mg/1	0 mg/1	-	0.023 mg/1	0.092 mg/1
Total Chlorophyll					
Periphyton*	0.0031 mg/cm²/day	0.0023 mg/cm²/day	0.0041 mg/cm²/day	0.0046 mg/cm²/day	0.0036 mg/cm²/day
Phytoplankton	1.707 mg/m³	5.121 mg/m³	2[illegible] mg/m³	0.788 mg/m³	1.341 mg/m³

*Mean of four determinations

STANDARD TITLE PAGE

1. Report No. CR-163122 Vol. III, Part 2	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Vol. III, Part 2: A Continuation of Base-Line Studies for Environmentally Monitoring Space Transportation Systems at John F. Kennedy Space Center		5. Report Date
		6. Performing Organization Code
7. Author(s) F. F. Snelson, Jr.		8. Performing Organization Report No. TR 51-2, Vol. III, Part 2
9. Performing Organization Name and Address Department of Biological Sciences University of Central Florida P.O. Box 25000, Orlando, Florida 32816		10. Work Unit No.
		11. Contract or Grant No. NAS 10-8986
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D. C. 20546		13. Type of Report and Period Covered Environmental Base Line October 1976-December 1978
		14. Sponsoring Agency Code MD-B

15. Abstract

Volume III, Part 2: Ichthyological Studies, Sailfin Molly Reproduction Study. Part 2 reports the results of a study conducted to determine the applicability of monitoring populations of the sailfin molly and its reproductive efforts as reliable indicators of environmental effects of aerospace activities in the Kennedy Space Center area. The report concludes that the sailfin molly experiences drastic fluctuations in population and reproductive success and is not an appropriate factor for monitoring to establish perturbations of the environment due to aerospace activities.

Supplementary note: Prepared under the sponsorship of the Biomedical Office, Bioscience Operations, Dr. William M. Knott and Dr. Paul Buchanan.

16. Key Words

Reproduction; Indicator Species; Poccilia Latipinna; pregnancy; embryos; eggs

17. Bibliographic Control STAR Category 51	18. Distribution Unlimited

19. Security Classif.(of this report) Unclassified	20. Security Classif.(of this page) None	21. No. of Pages	22. Price

KSC FORM 16-272NS (REV 7/78)