Growth in captive smalltooth sawfish, *Pristis pectinata*

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Glen Kelly[7]

1. Sea World, Inc.
2. Sea World Florida
3. National Aquarium in Baltimore
4. Six Flags World of Adventure
5. Kent, OH
6. Sea World Texas
7. Atlantis Paradise Resort

Pristis pectinata

Size at parturition: 60-70 cm total length (TL)

60 cm (Bigelow and Schroeder 1953), 70 cm (Simpfendorfer pers. comm.)

Maximum Size: 550 cm to 730 cm TL

600 cm ; reported to 730 cm (Simpfendorfer 2000, 2002; Last and Stevens 1994)

Size at maturity:

Male: 270 cm, Female 360 cm (Simpfendorfer 2002)

Growth in *Pristis pectinata*

(Bohorquez 2001)

Mean growth rate of three sawfish of unspecified sex: 19.6 cm/yr

84.5 cm TL to 320 cm TL in 12 years

(Thorson 1982)

One animal, unspecified sex: 30 cm/yr

121.9 cm to 213 cm + in 3 years, 2 months

One animal, unspecified sex: 30 cm/yr

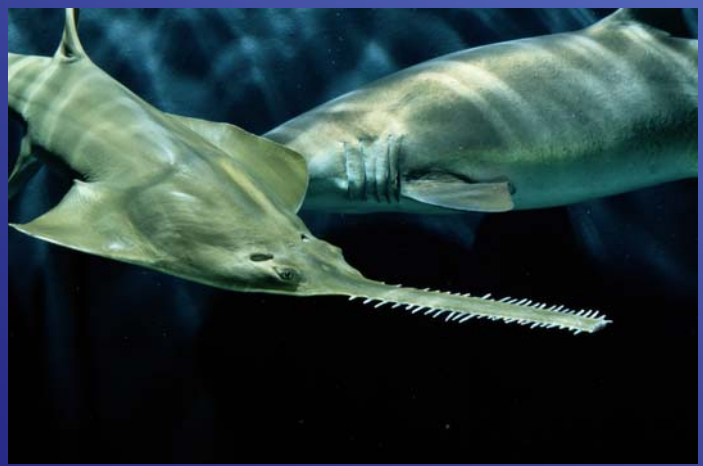
121.9 cm to 182.9 cm + in 2 years two months

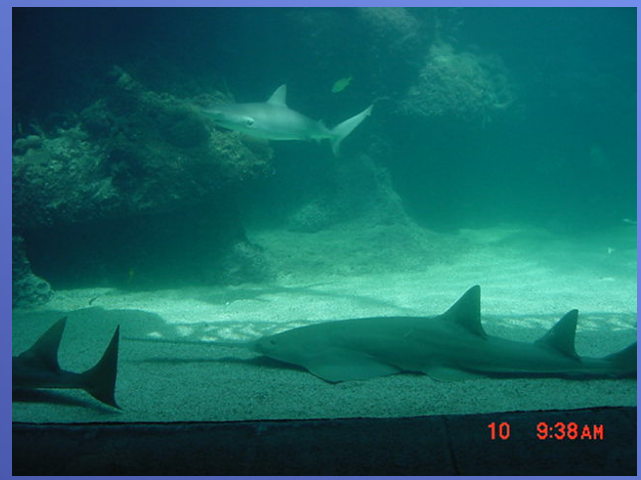
Methods

Smalltooth sawfish maintained in artificial seawater; closed recirculating systems and open systems

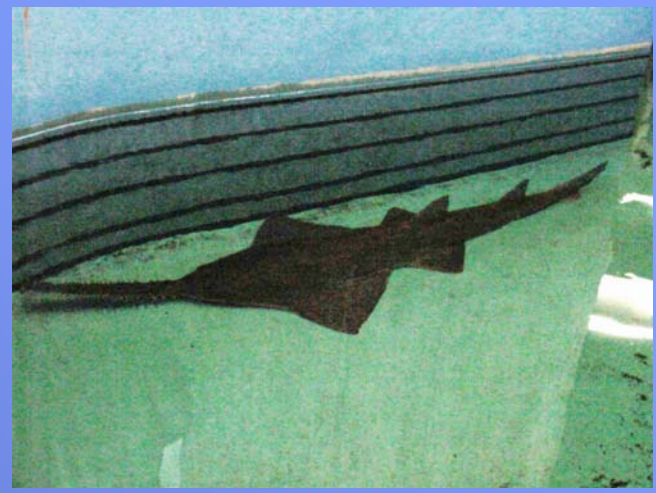
Range: 112 cm to 341 (45-411.5) cm TL

Weekly ration: 2.5 to 4.0% bw/week





Data



Measurements taken:

n= 9 (4 males, 5 females)

* n=10 (4 males, 6 females)

PCL,FL,TL Wt RL AO/AS

All Data: estimated plus measured lengths:

n = 16 (6 males, 10 females)

Methods: Growth

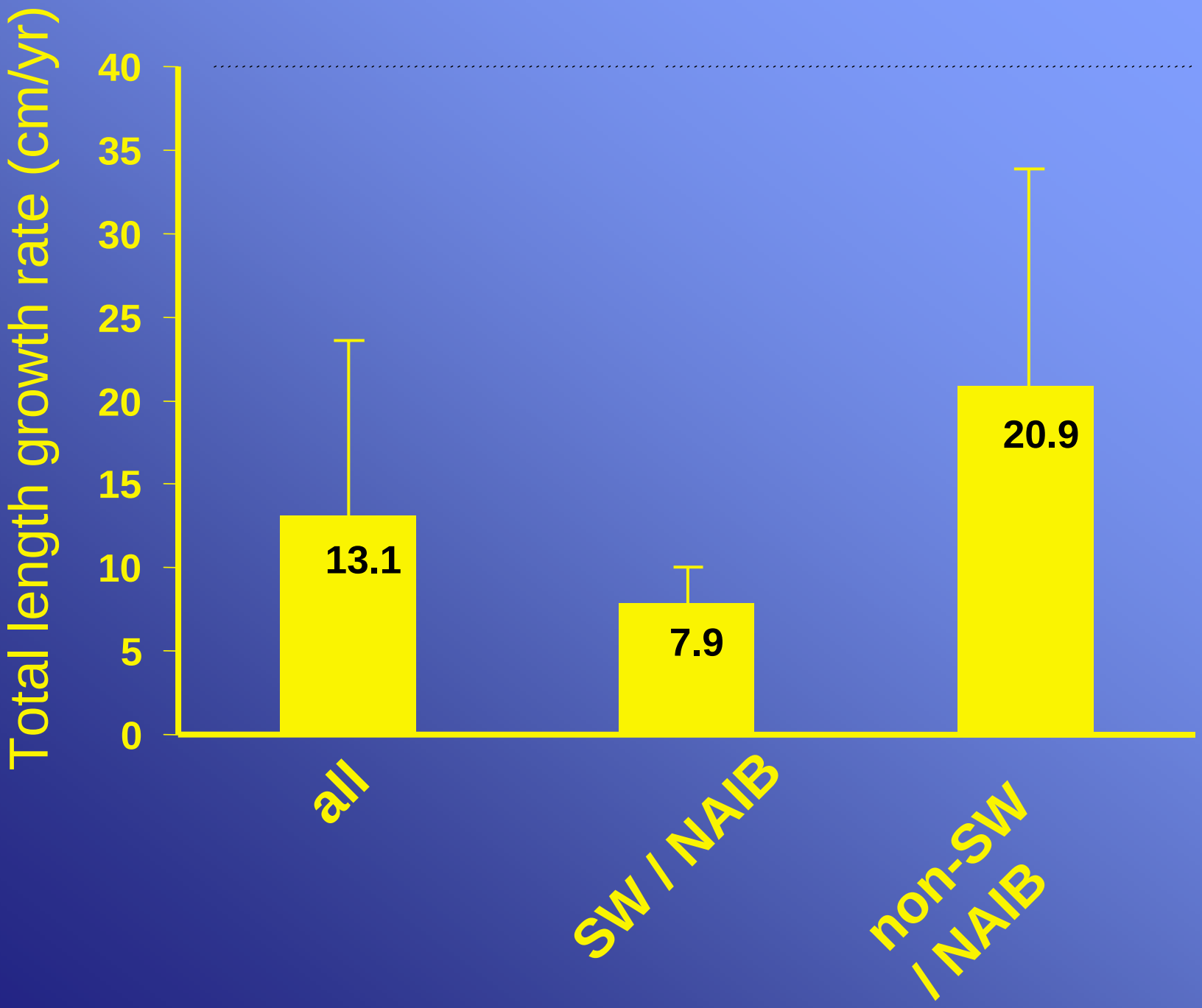
1. Mean Length v. Growth Rate (Gulland and Holt 1959)

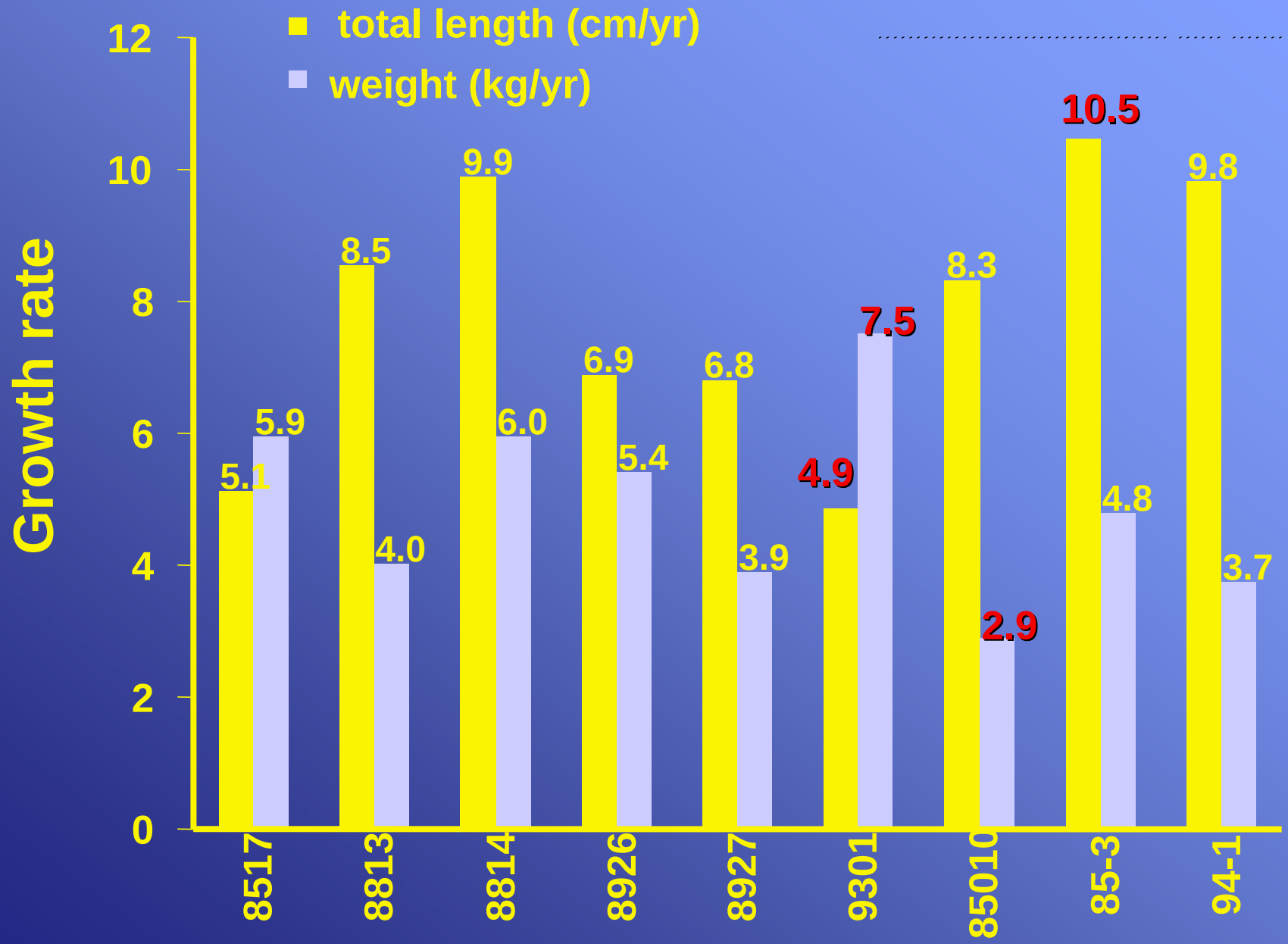
a. n= 9; 4 males, 5 females

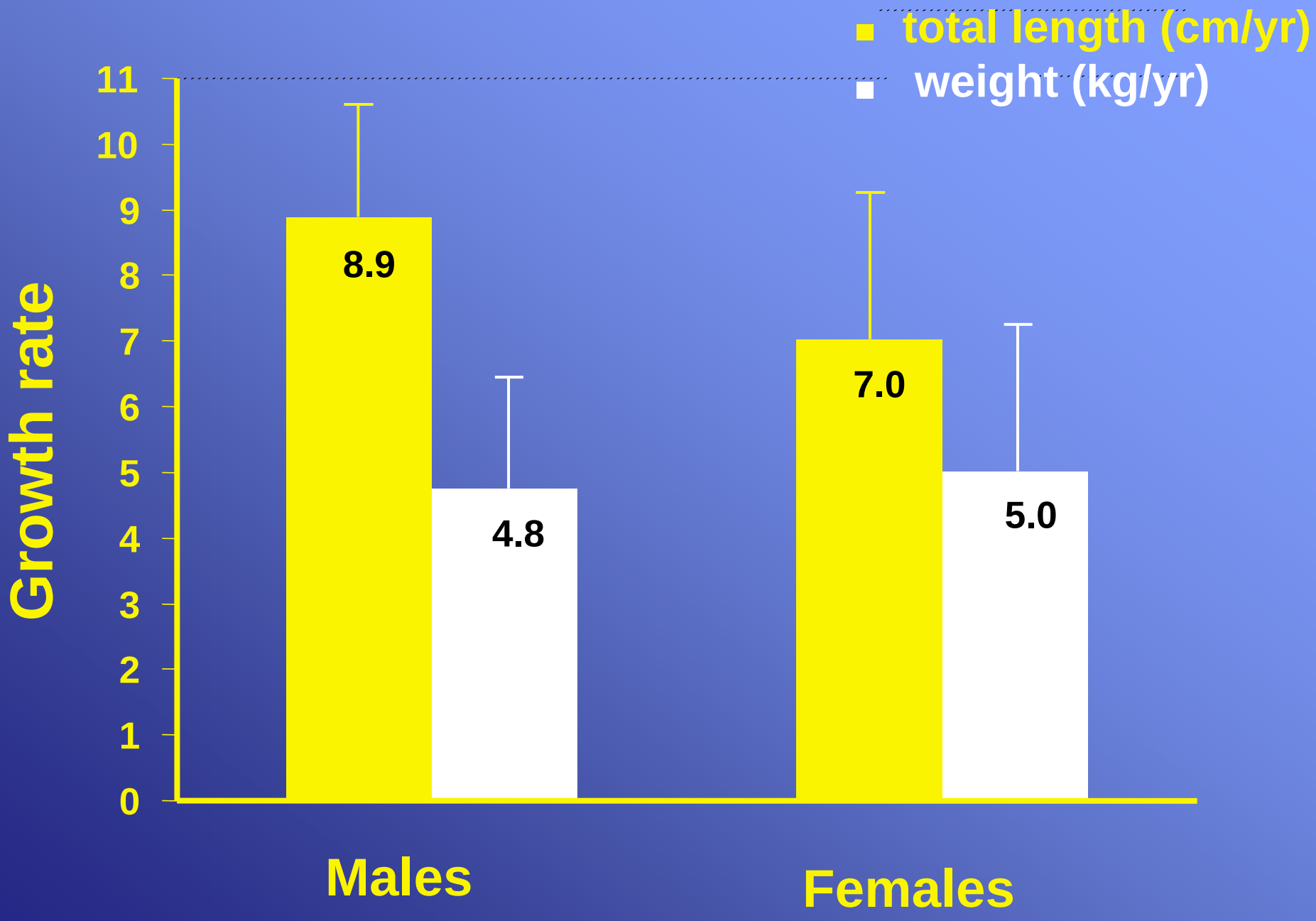
b. . n = 16; 6 males, 10 females

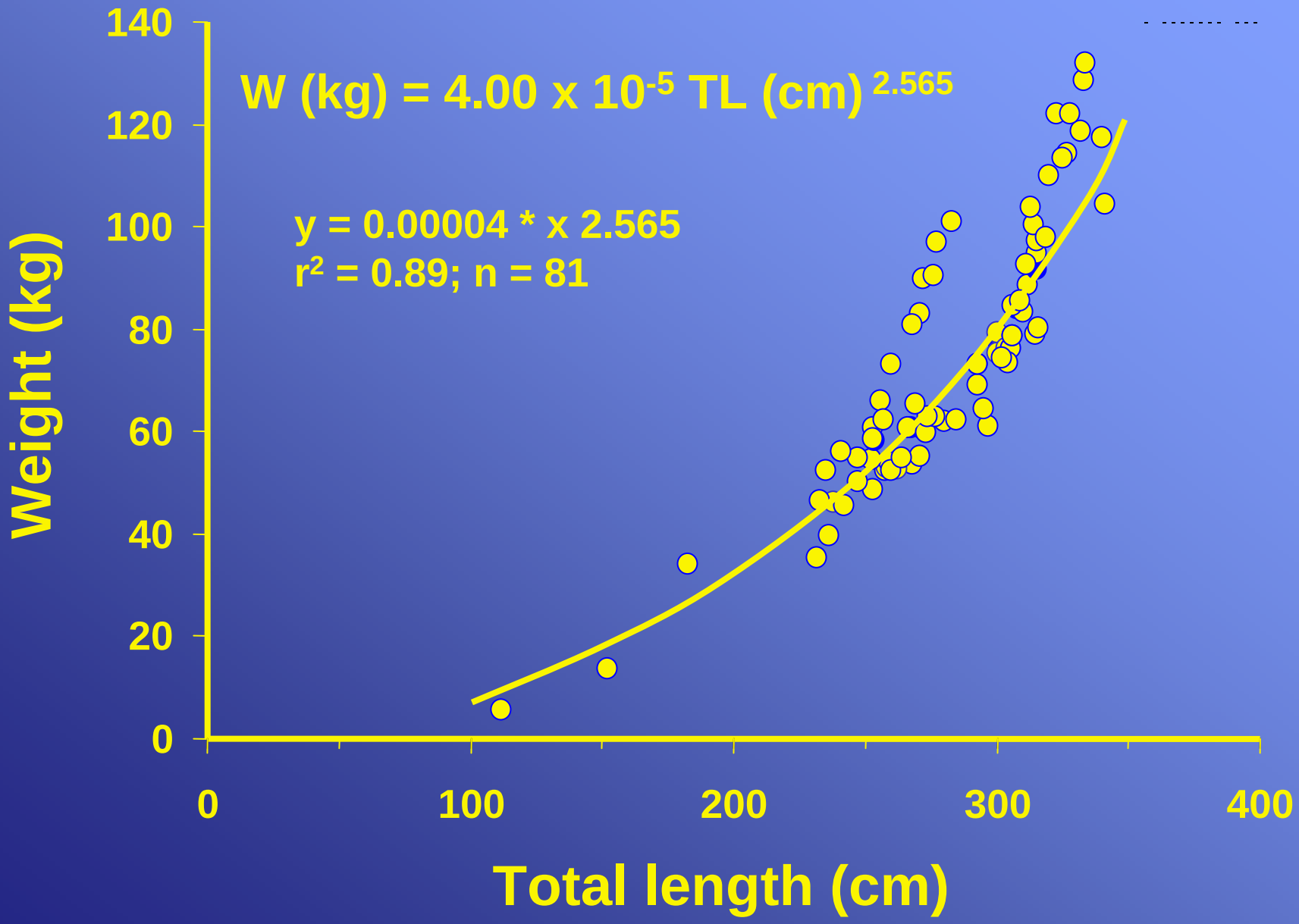
2. Maximum Likelihood Estimate (Francis 1988); treated each sawfish as a multiple recapture

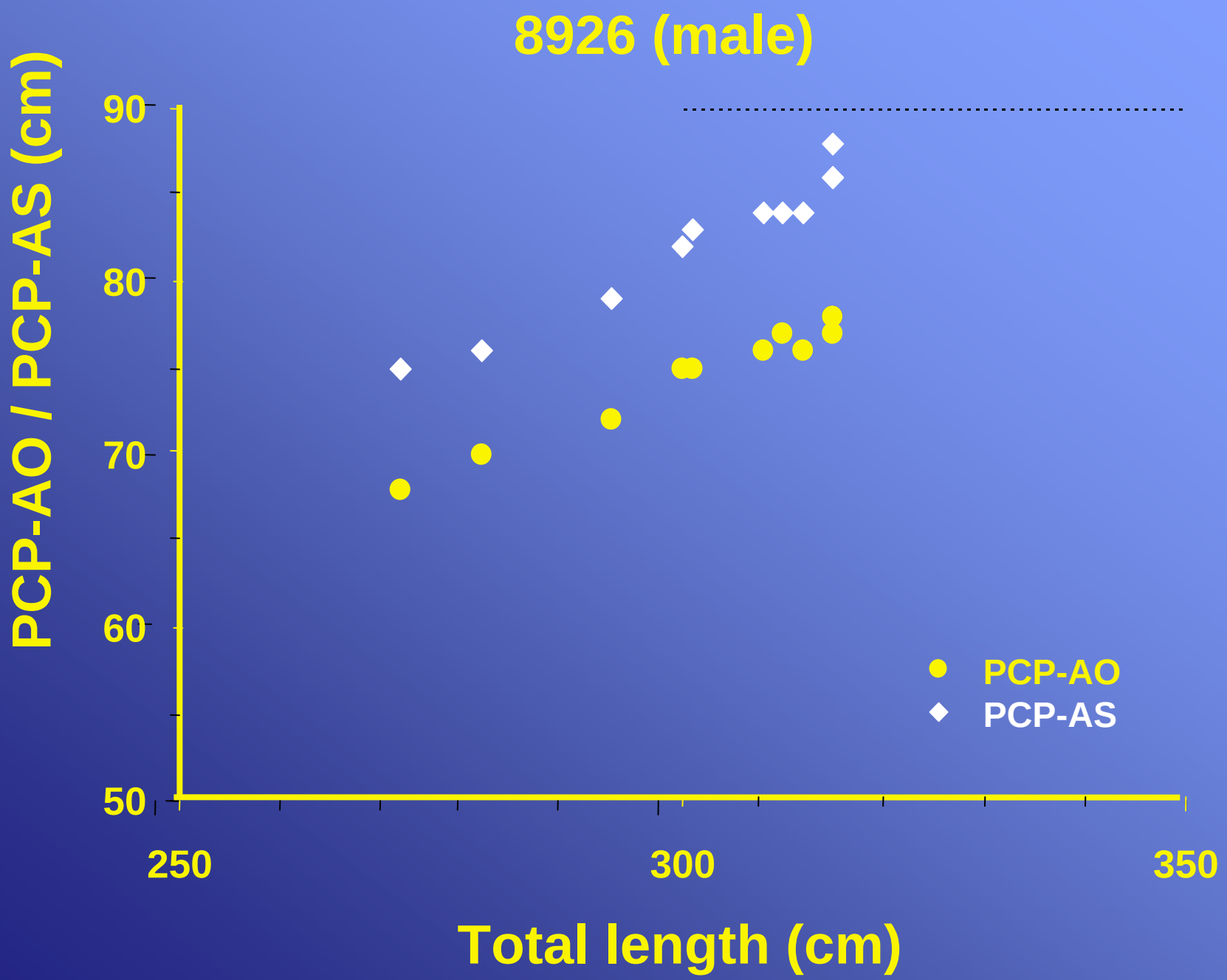
n = 10; 4 males 6 females

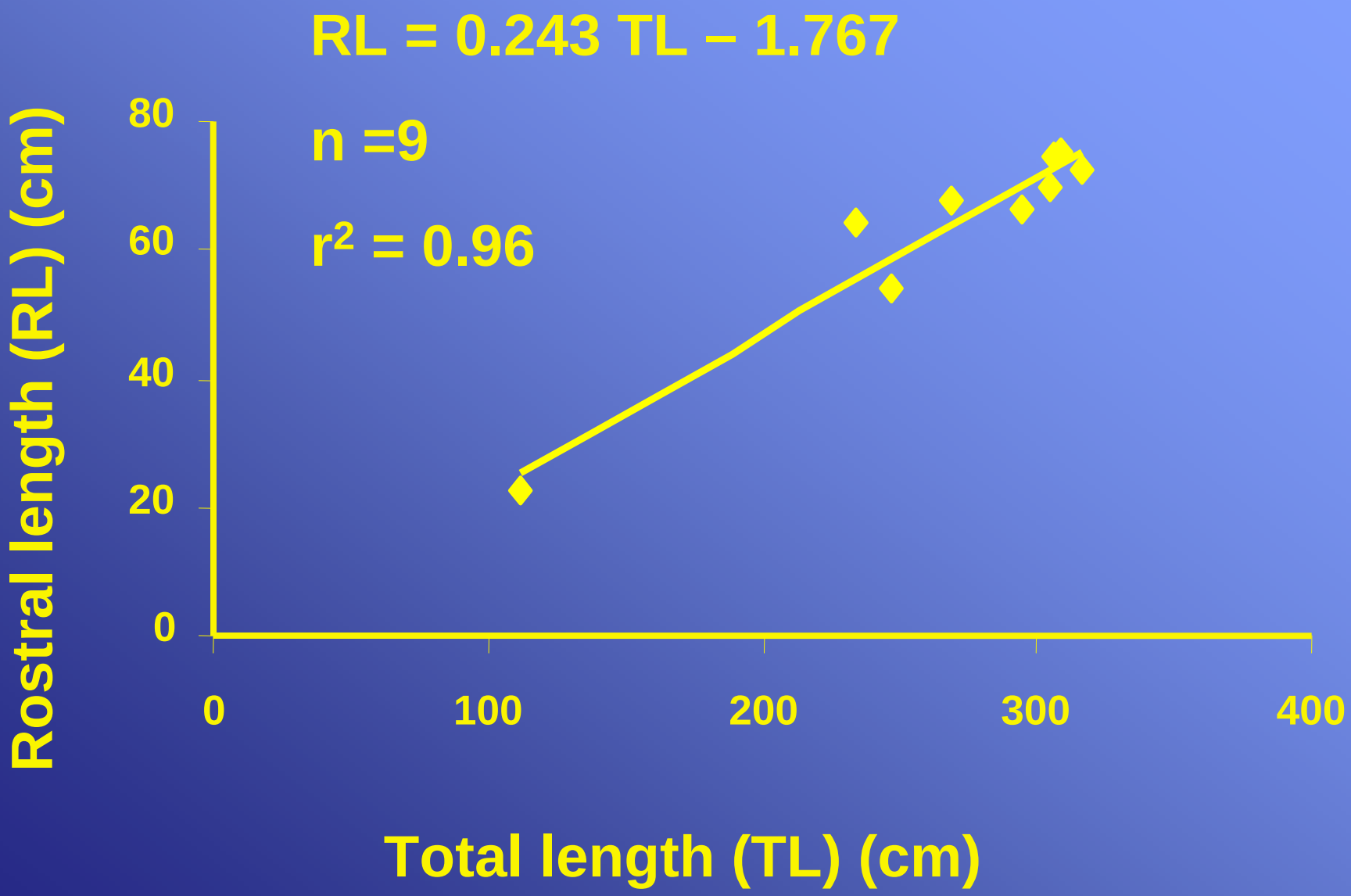

Total length growth rate (cm/yr)
40
35
30
25
20
15
10
5
0
13.1
7.9
20.9
all
SW / NAIB
non-SW / NAIB

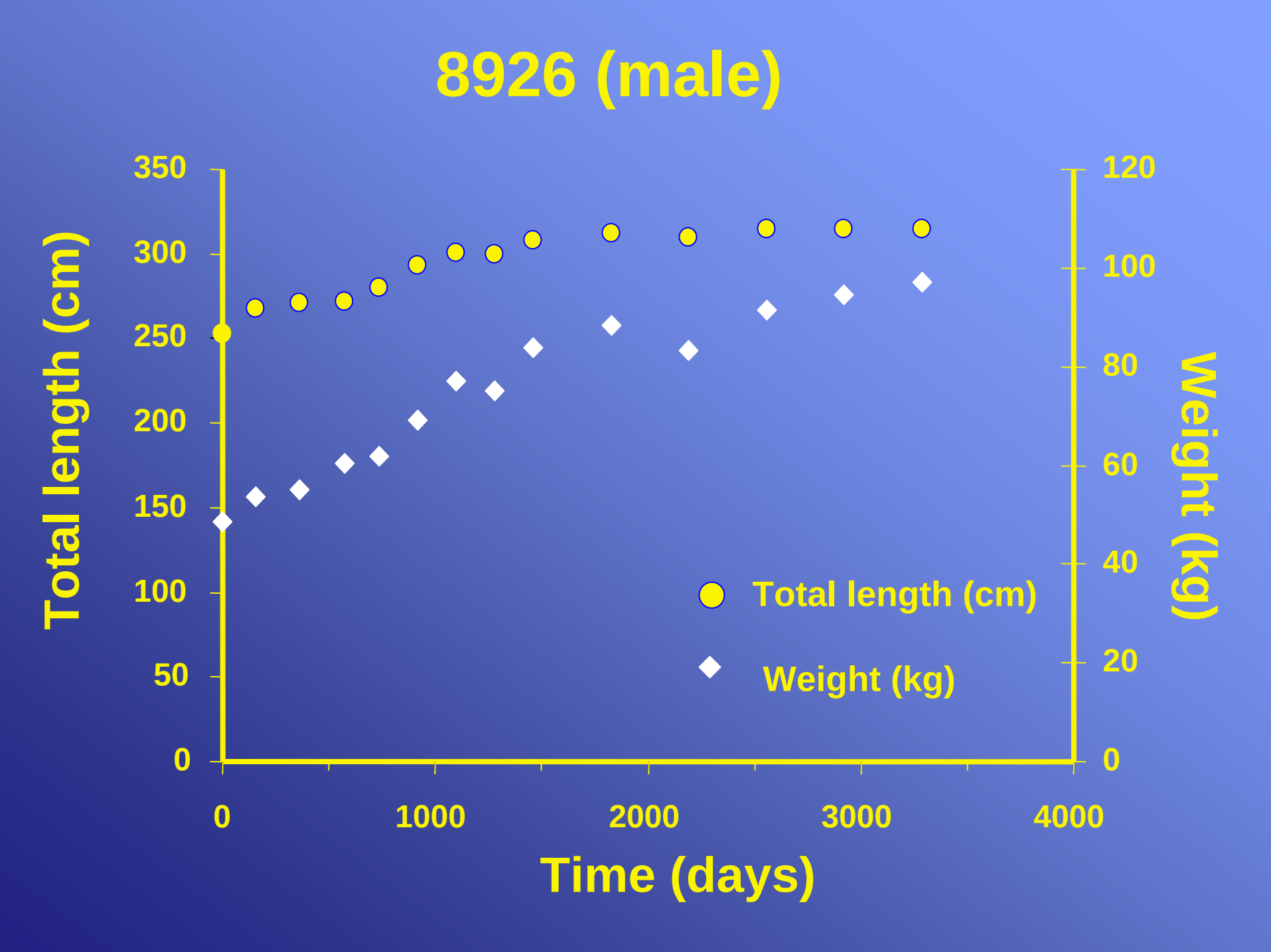

total length (cm/yr)
weight (kg/yr)
Growth rate
12
10
8
6
4
2
0
5.1
5.9
8.5
4.0
9.9
6.0
6.9
5.4
6.8
3.9
4.9
7.5
8.3
2.9
10.5
4.8
9.8
3.7
8517
8813
8814
8926
8927
9301
85010
85-3
94-1


total length (cm/yr)
weight (kg/yr)
Growth rate
11
10
9
8
7
6
5
4
3
2
1
0
8.9
4.8
7.0
5.0
Males
Females

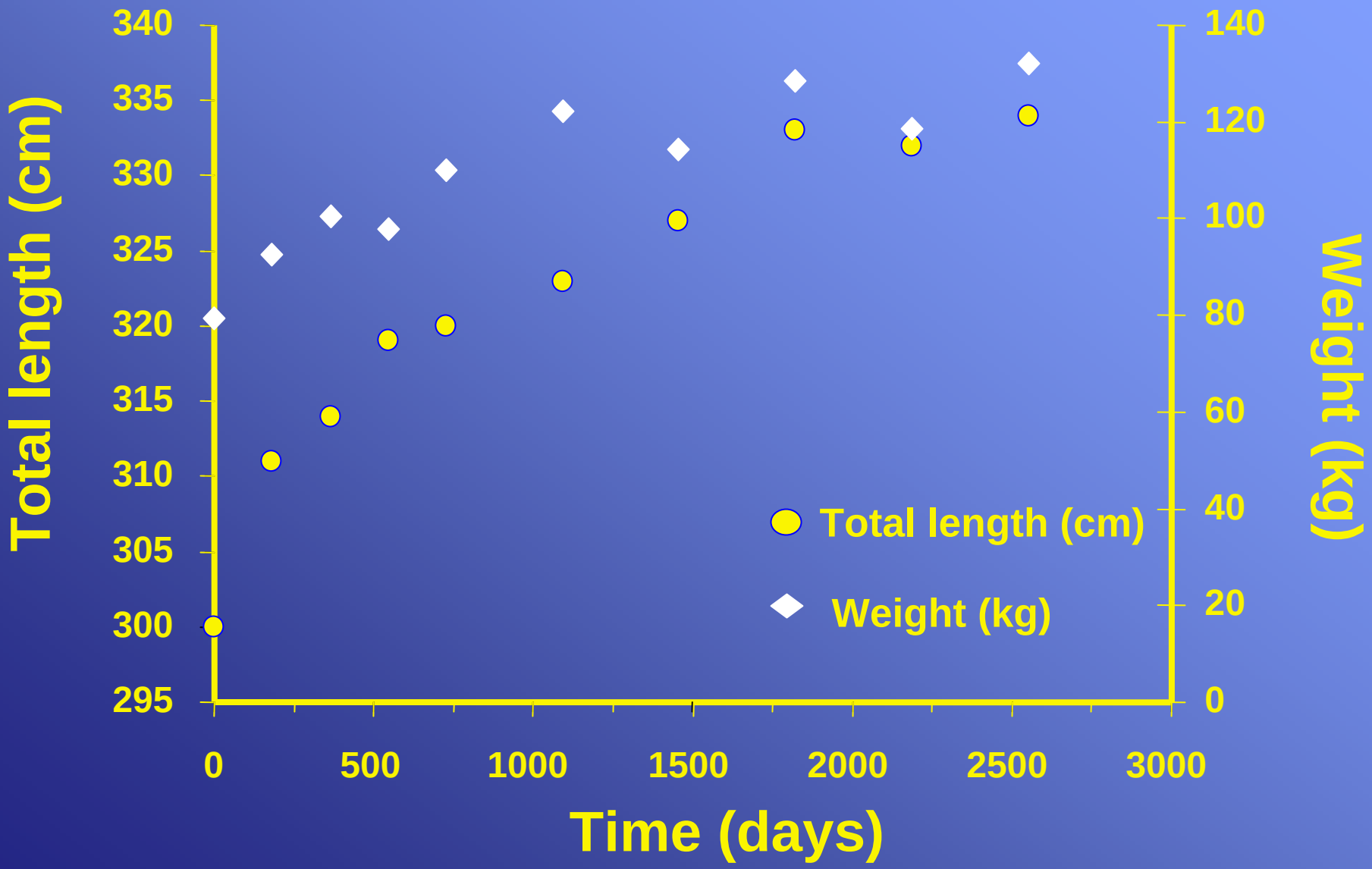

W (kg) = 4.00 x 10-5 TL (cm) 2.565
y = 0.00004 * x 2.565
r2 = 0.89; n = 81
Weight (kg)
140
120
100
80
60
40
20
0
0
100
200
300
400
Total length (cm)


8926 (male)
PCP-AO / PCP-AS (cm)
90
80
70
60
50
250
300
350
Total length (cm)
PCP-AO
PCP-AS

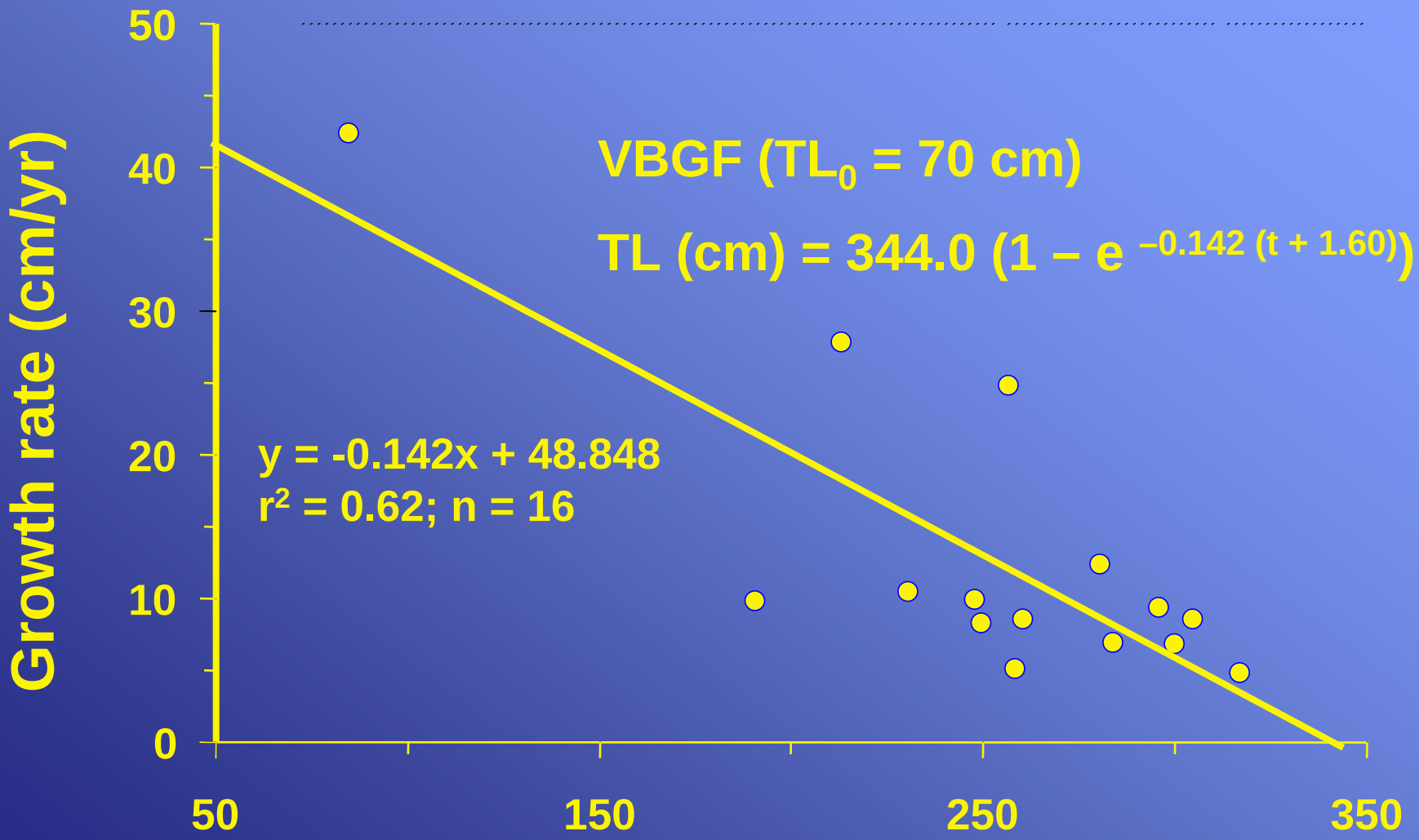

RL = 0.243 TL – 1.767
n =9
r² = 0.96
Rostral length (RL) (cm)
80
60
40
20
0
0
100
200
300
400
Total length (TL) (cm)


8926 (male)
Total length (cm)
Weight (kg)
350
300
250
200
150
100
50
0
120
100
80
60
40
20
0
0
1000
2000
3000
4000
Time (days)
Total length (cm)
Weight (kg)

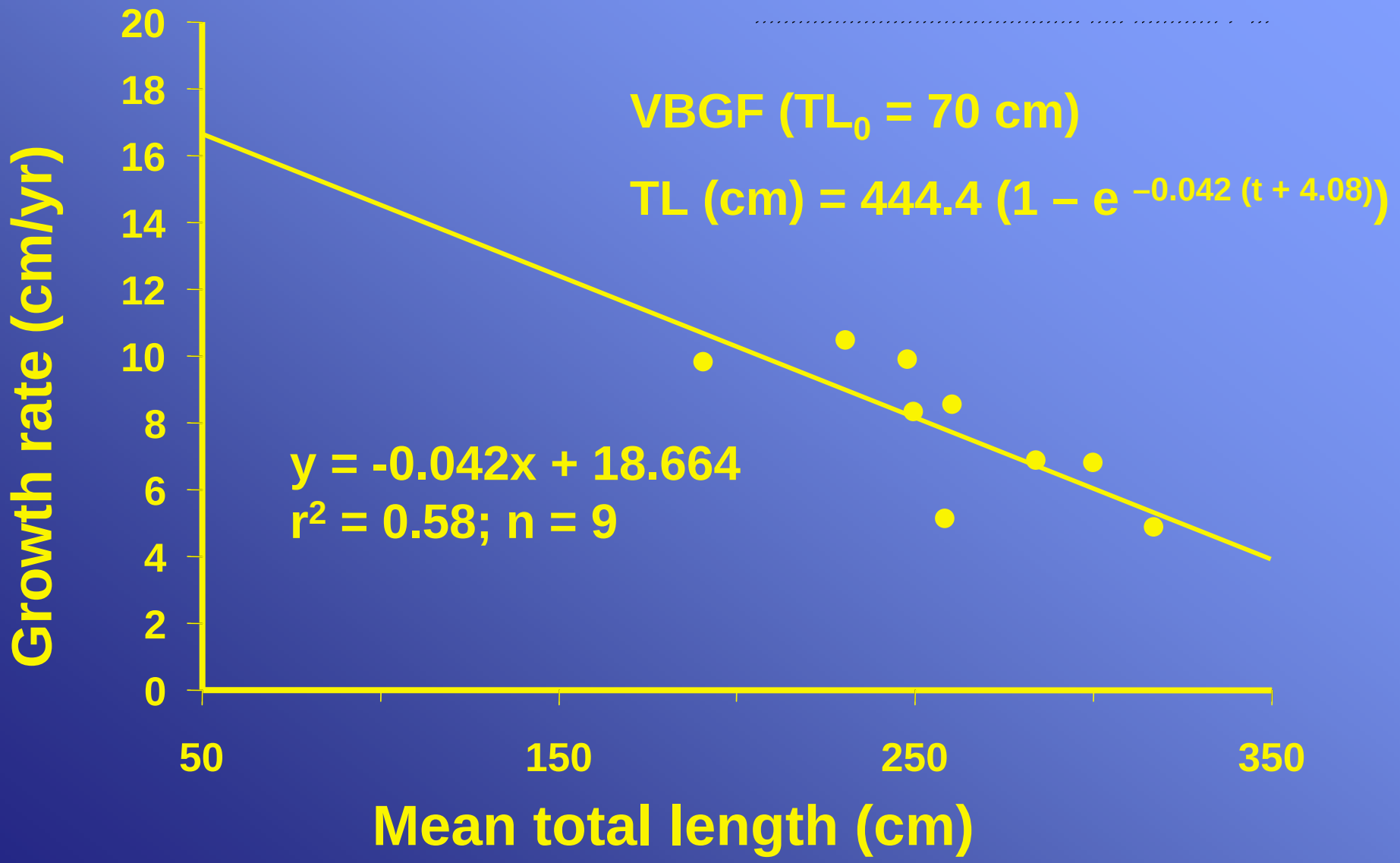
9301 (female)


Total length (cm)
340
335
330
325
320
315
310
305
300
295
Weight (kg)
140
120
100
80
60
40
20
0
0
500
1000
1500
2000
2500
3000
Time (days)
Total length (cm)
Weight (kg)

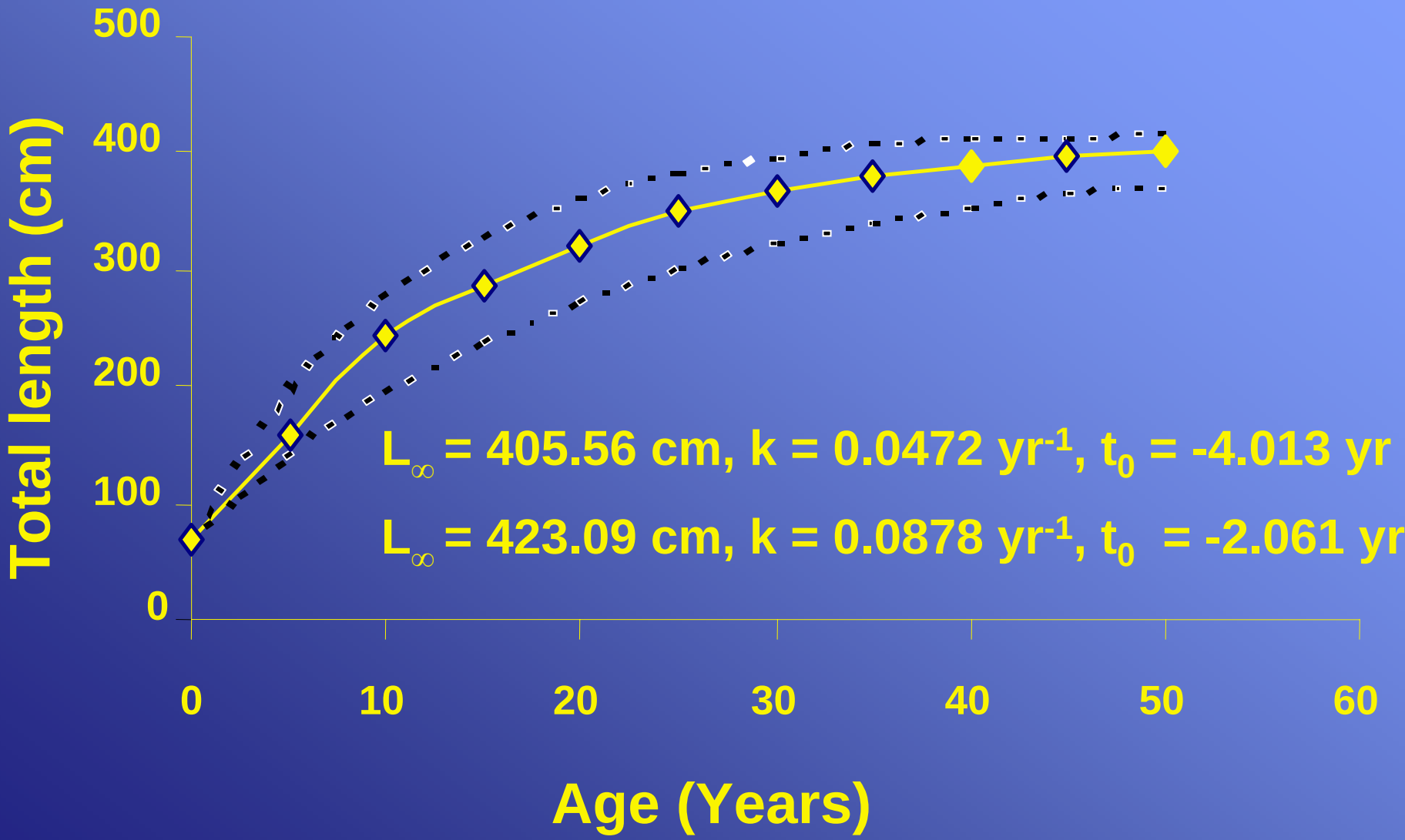
Gulland & Holt (1959) all animals



Gulland & Holt (1959) SW / NAIB animals



L_t (cm) = 412.53 cm $(1-e^{-0.0674(t + 2.757)})$



Pristis microdon

BC (OD), centra, least squares

k = 0.047 (0.066) yr^{-1}, L_∞ = 397.9 (363) cm

t_0 = -5.54 (-4.07) yrs.

L_0 = 80 cm

(Tanaka 1991)

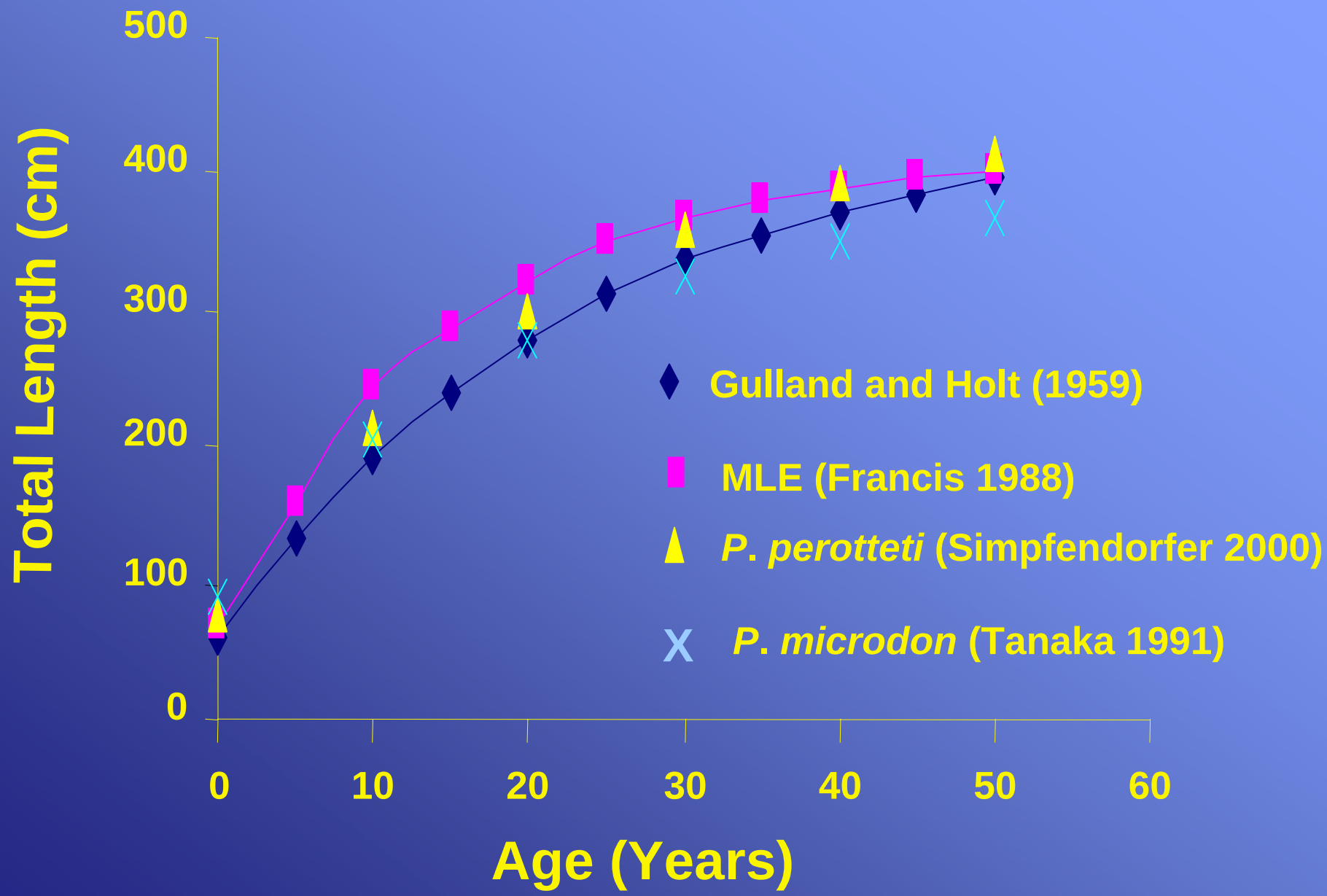
Pristis perotteti

Tagging data; minmizing the sum of squares

k = 0. 045 yr^{-1}, L_∞ = 456 cm

t_0 = - 4.00 yrs, L_0 = 75 cm

(Thorson 1982; Simpfendorfer 2000)


Total Length (cm)
500
400
300
200
100
0
0
10
20
30
40
50
60
Age (Years)
Gulland and Holt (1959)
MLE (Francis 1988)
P. perotteti (Simpfendorfer 2000)
P. microdon (Tanaka 1991)

Summary

Results indicate slower growth than previously reported

Despite the paucity of reliable growth data, general shape of growth curve could be estimated

Importance of collecting accurate morphometric data

Of the two methods used, Maximum Likelihood is more robust

Estimated age at maturity: 19 years for males and 33 years for females

Acknowledgements

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