Assessment of queen scallop (*Aequipecten opercularis*) north of the Faroe Islands in 2013

Luis Ridao Cruz

Una Matras

Faroe Marine Research Institute (Havstovan)

1. Introduction

The queen scallop fishery in the Faroe Islands began in the early 1970s. The main area is east of the Islands. Compared to the eastern area there is not a long tradition for queen scallop (*Aequipecten opercularis*) dredging in the area north of the islands. During the years 1989/90, a factory trawler "Fame" dredge the area intensively. Since then no dredging has been in the area until the years 1997, 1998 when an experimental queen scallop fishery took place. A relatively steady fishery has been ongoing thereafter. The scallop beds are situated about 15 n. mi. (30 km.) off shore in depths of 80-115 m.

Average catches were around 100 tons from 2001 to 2010 (Figure 1.) Since 2011 the total catch has increased substantially to peak 1 600 tons in 2012. A preliminary quota of 1 000 tons was set in 2013 with a possibility of an increase depending on the results of the present study. For 2013 a total quota of 2 000 tons was established for the north-area scallop fishery. (In figure 1 landings in 2013 represent catches from January to October).

The following assessment is based on a research survey carried out by the only vessel present in the scallop fishery (M/S Norðheim)

The dominant cohabitants in the main habitat of the scallop are different species of whelks, mussels, starfishes, brittlestars, sea urchins, sea anemones, hydroids and hermit crabs.

2. Material and methods

The methodology in the present assessment is the use of a swept-area biomass based on 42 hauls recorded by the Faroese scallop vessel Norðheim in the period November to December 2013. The survey area covered the main fishing ground north of the Faroes (Figure 2.1).

The area was divided in 50 equal-sized squares of 3.22 km^2 each (1.702 km longitude, 1.893 km latitude) covering a total area of 161 km^2 (Figure 2.2). Due to logistic issues some stations were either discarded or not taken into account in the analysis.

Every square was towed once with a double 12-feet dredge (7.3 m). Towing time was 10 minutes and the average towing speed 3.8 knots (7 km/h). Catch was recorded in every haul and a random sample of 10 scallops taken for further biological measurements.

Density is calculated by dividing catches by the swept area:

$$\text{Density (kg/km}^2\text{)} = \text{Catch (kg)} \ / \ \text{Area Swept (km}^2\text{)}$$

Swept area is calculated as :

$$\text{Swept Area (km}^2\text{)} = \text{towing time (hr)} \times \text{towing speed (km/hr)} \times \text{width of trawl (km)}$$

Biomass is calculated as area of square times density:

$$\text{Biomass (t)} = \text{Area square (km}^2\text{)} \times \text{Density (kg/km}^2\text{)}$$

3. Results

Geographical distributions of catch, density and biomass are shown in figures 3.1, 3.2 and 3.3 respectively. The graphs clearly display large concentrations of scallops in the northern sea-beds whereas the southern waters show almost a complete lack thereof.

A total catch of 21.9 tons was landed with a mean density of 3 045 t/ km^2 over the entire survey area.

Average catch is 0.5 tons (std. Error = 0.087 t.) while mean density is estimated at 72.5 t/ km^2 (std. Error = 14.7 t/km^2)

The estimated total biomass of queen scallop in the northern areas is 9 800 tons with an average of 234 t (std. Error = 47 t). Based on precautionary-approach principles (20% of total stock) a quota not larger than 2 000 tons would be reasonable estimate for the sustainable harvest of stock.

The stock in the northern area consist mostly of scallops aged 2 to 5 years old (Figure 3.4). There is a large overlapping in the length distribution of scallops aged 2 and older (Figure 3.5).

Figures 3.5 and 3.6 display several relations between some of the biological measurements taken on the scallop samples. Wet weight relates exponentially ($W = aL^b$) with scallop shell length (Figure 3.5). The average weight of a 60 mm. scallop is 30 gr. and it can reach up to 47 gr. at a 70 mm length.

It is clear when looking at age-disaggregated shell-length, -width and -thickness distributions that large variability is present in 1-year old scallops compared to older individuals (Figures 3.6.a, 3.6.b, 3.6.c)(This may be an effect of that spawning occurs twice a year in Feb. and Aug.) Asymptotic shell-length and -width is around 80mm while shell-thickness lies at 25 mm. Soft body weight of 4-year and older scallops is around 20 gr. although some individuals may reach up to 30 gr. (Figure 3.6.h)

Considerable quantities of empty-shell mussels (*Modiolus modiolus*) were found in the southern sector of the survey grid (stations 29, 34, 35, 37, 39, 40, 43, 44, 46)(personal communication). Unfortunately no precise figures were recorded during the survey period.

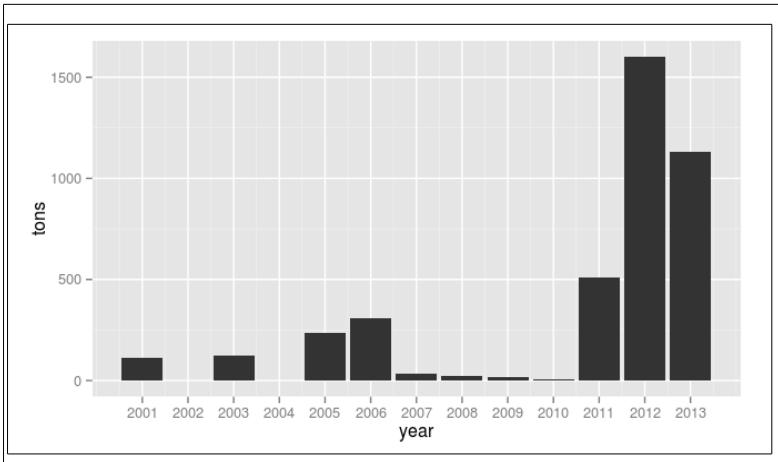


Figure 1. Queen scallop. Landings in northern area (tons)

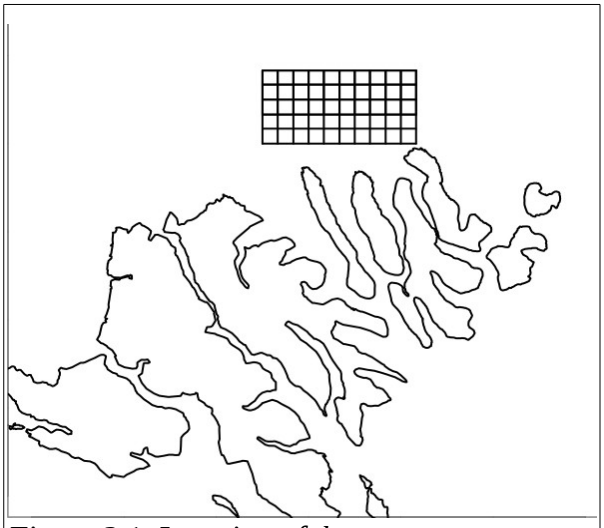


Figure 2.1. Location of the survey area.

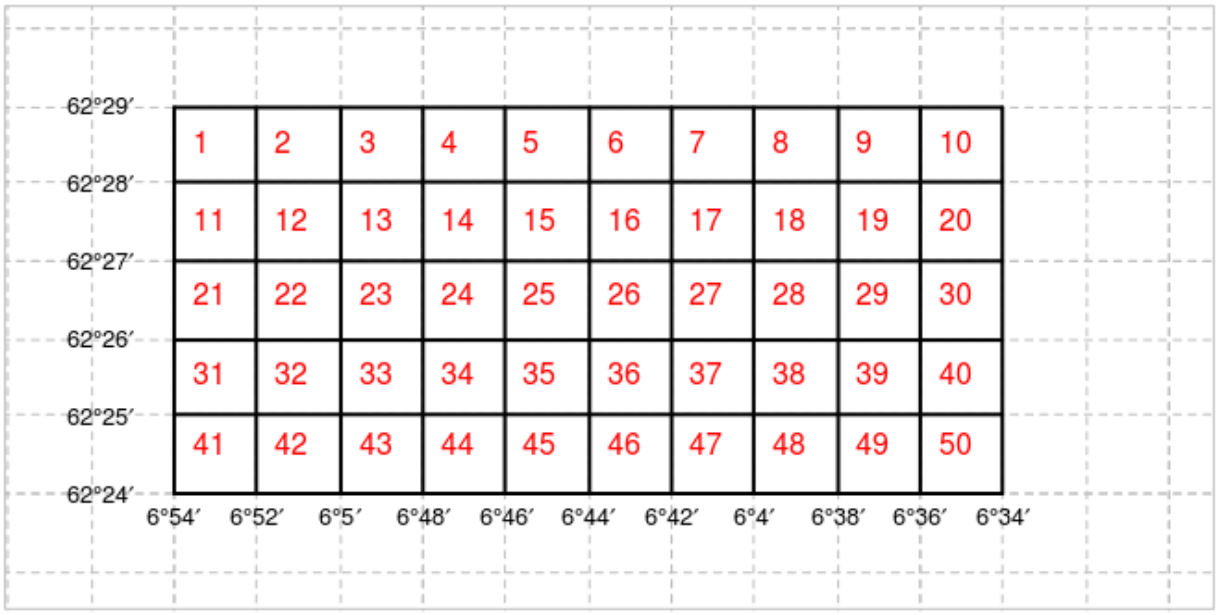


Figure 2.2. Geographical representation of the survey area. Stations 27-31, 43 and 49-50 were discarded and/or not towed.

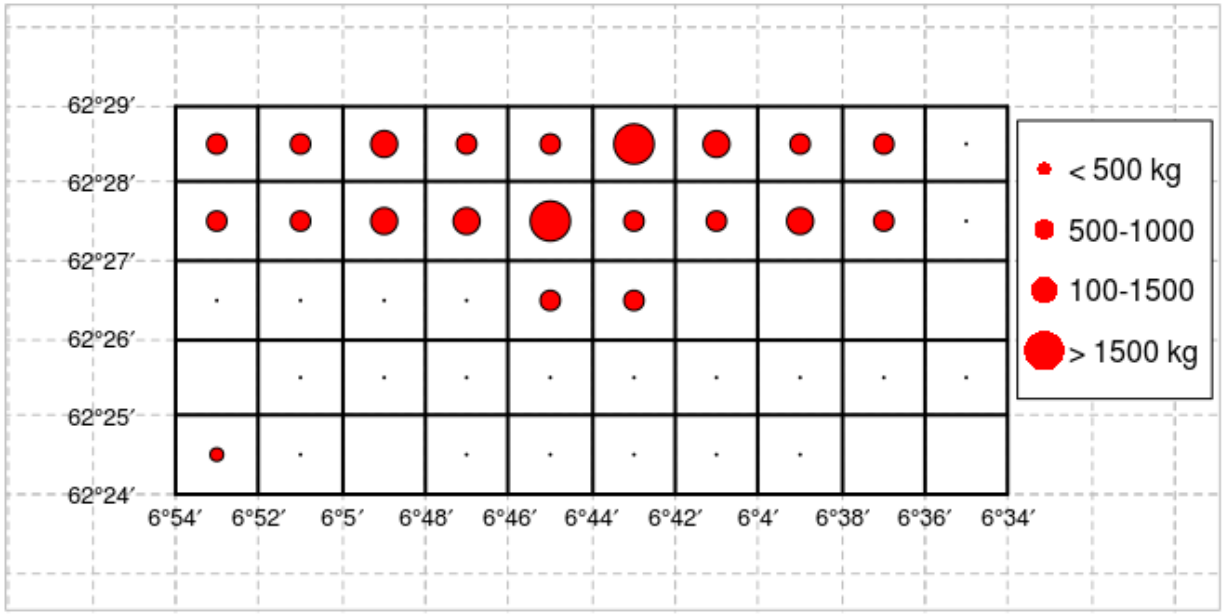


Figure 3.1. Queen scallop. Catches (kg)

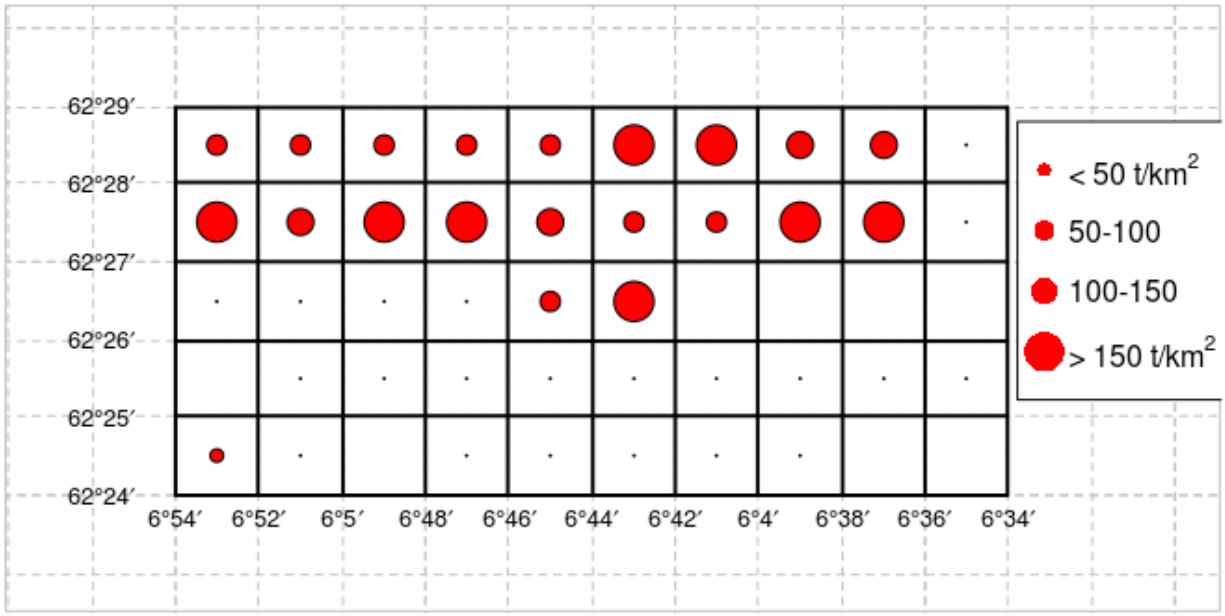


Figure 3.2. Queen scallop. Density estimates (t/km^2)

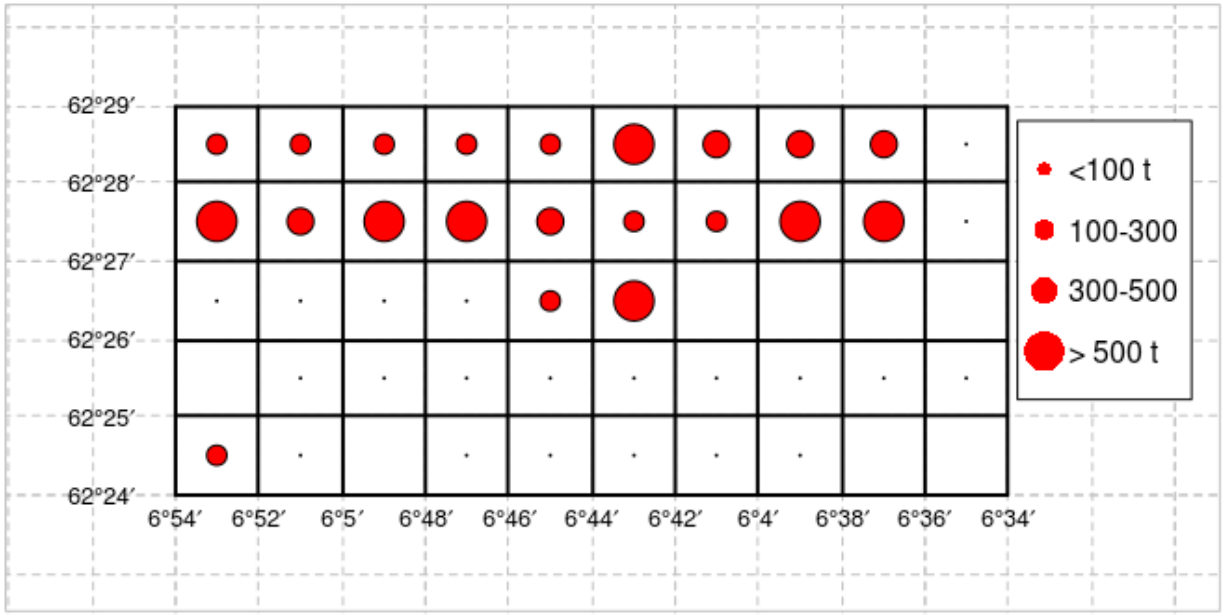


Figure 3.3. Queen scallop. Biomass estimates (tons)

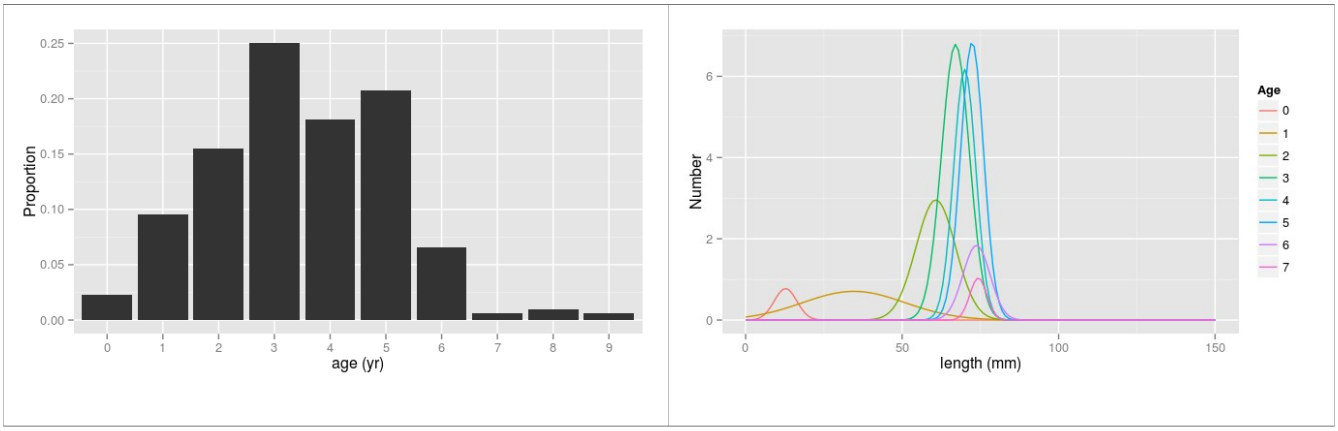


Figure 3.4. Queen scallop. Age composition (left-figure) and age-length relationship (right-figure)

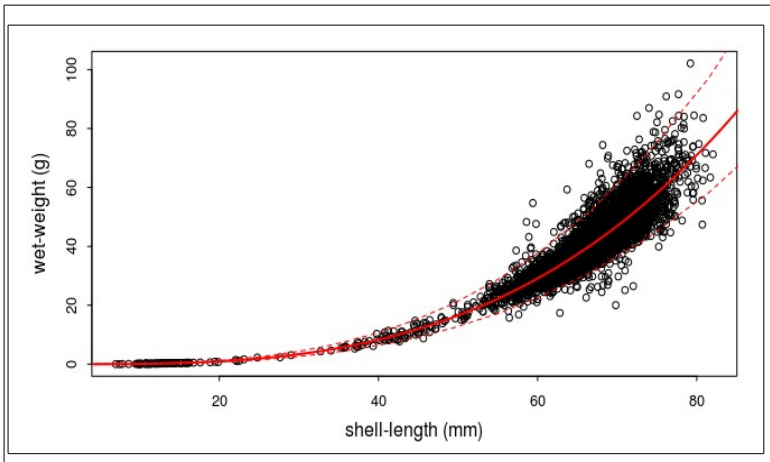
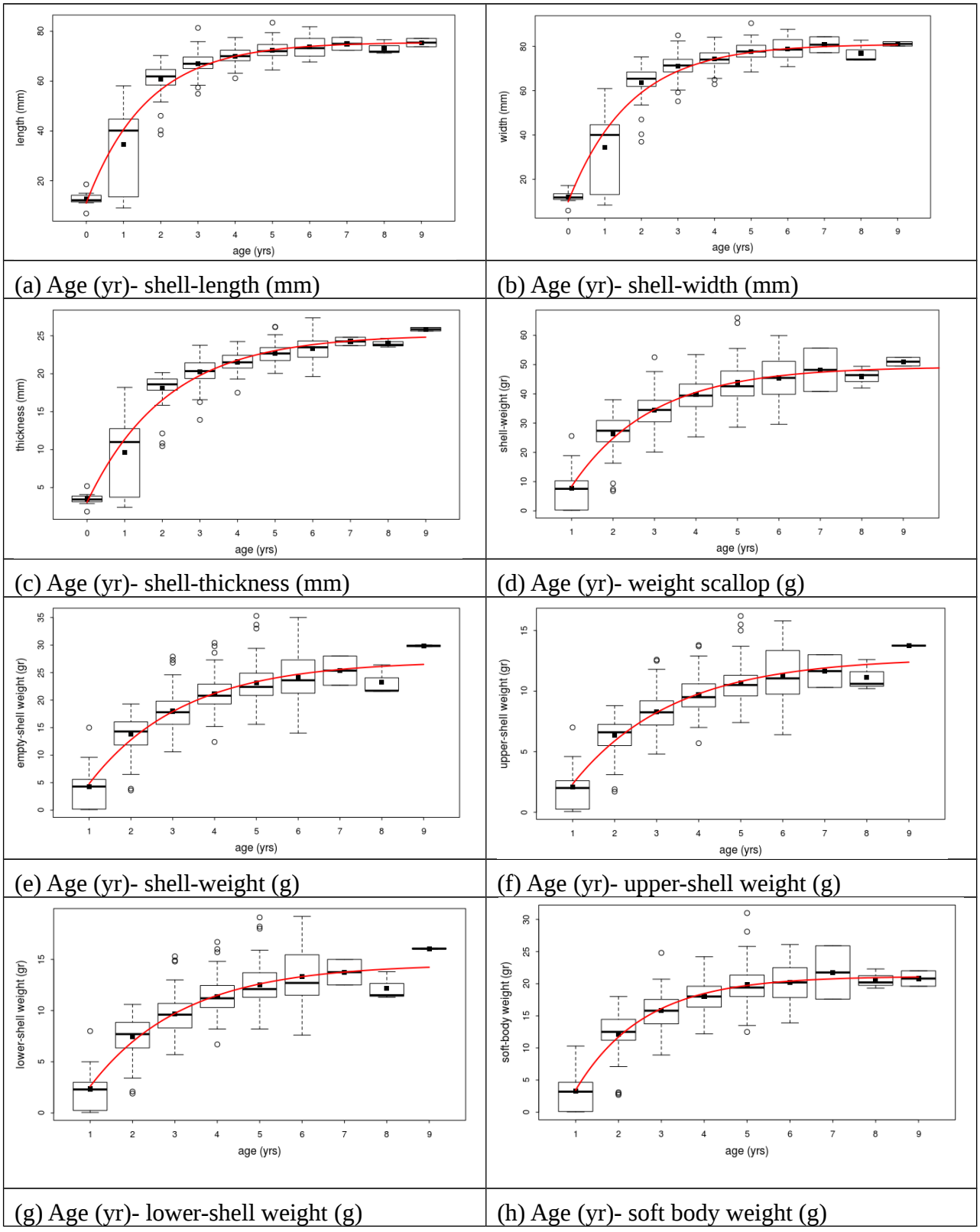


Figure 3.5. Queen scallop. Relation between shell-length (mm) and wet weight of scallop (gr)



(a) Age (yr)- shell-length (mm)

(b) Age (yr)- shell-width (mm)

(c) Age (yr)- shell-thickness (mm)

(d) Age (yr)- weight scallop (g)

(e) Age (yr)- shell-weight (g)

(f) Age (yr)- upper-shell weight (g)

(g) Age (yr)- lower-shell weight (g)

(h) Age (yr)- soft body weight (g)

Figure 3.6. Queen scallop. Relation between age (years) and shell-length (mm)(a), shell-width (mm.)(b), shell-thickness (mm)(c), scallop weight (gr)(d), shell-weight (gr)(e), upper-shell weight (gr)(f), lower-shell weight (gr)(g), soft body weight (gr)(h).