A preliminary investigation into the emergence of a parasite in sea scallops

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Preliminary – PDT use only.

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Appearance of affected scallops

- Typical gross appearance and intensity of affected scallops.
- In May of 2015, trips were landed from the newly opened AA that contained rust colored lesions on some meats.
- The first two trips demonstrating this were from the DMV

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Appearance of affected scallops

- Typical lesion size with number per scallop meat ranging from 1-5.
- The lesions presented on the exterior of the adductor muscle, typically opposite the sweet meat.
- Visible to the naked eye against the white meat. (~2-5mm)

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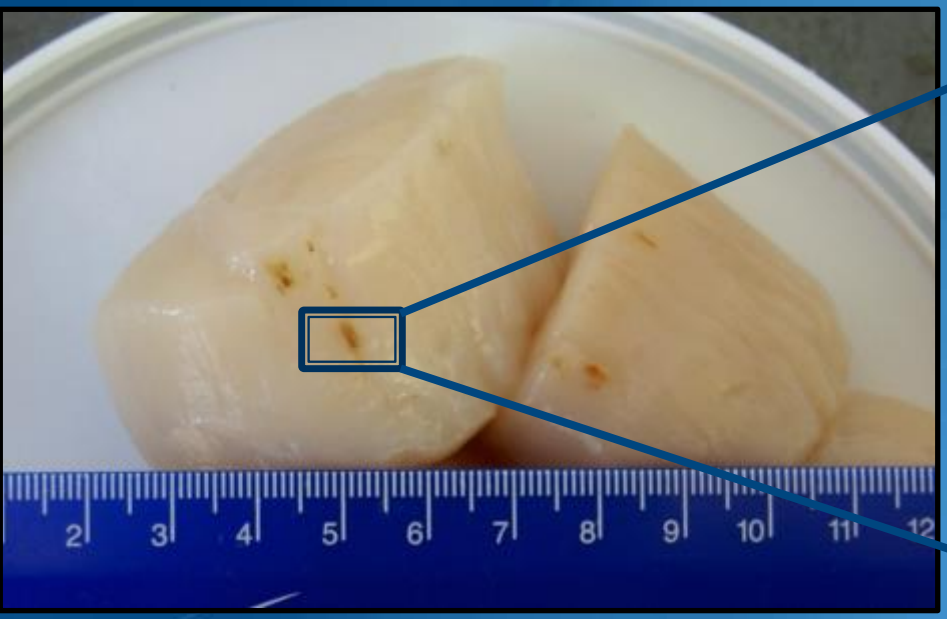
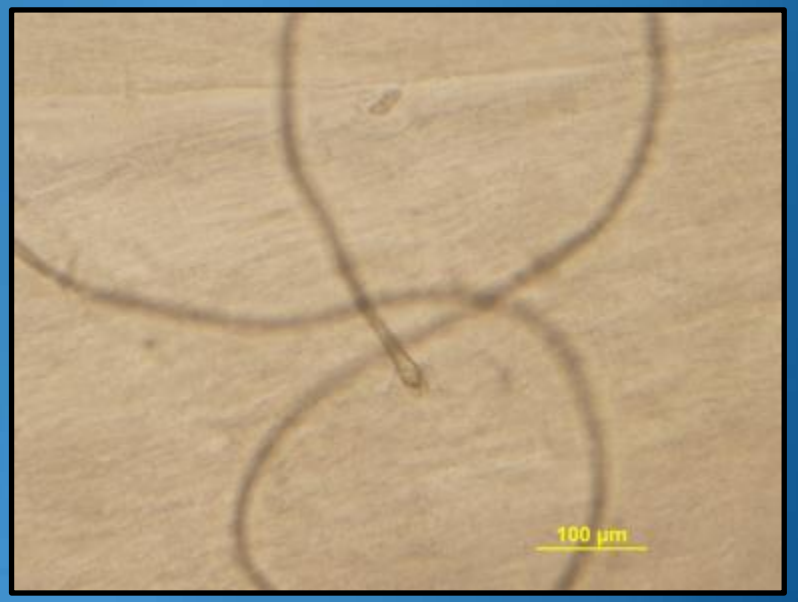
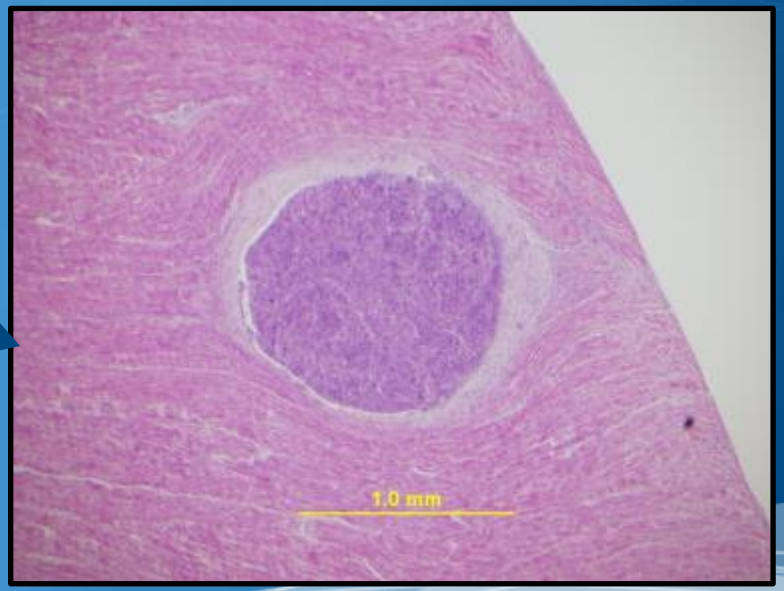
Preliminary histology

Fresh squash mount







Histologically processed: pink=muscle, blue=hemocytes surrounding foreign object (host response)

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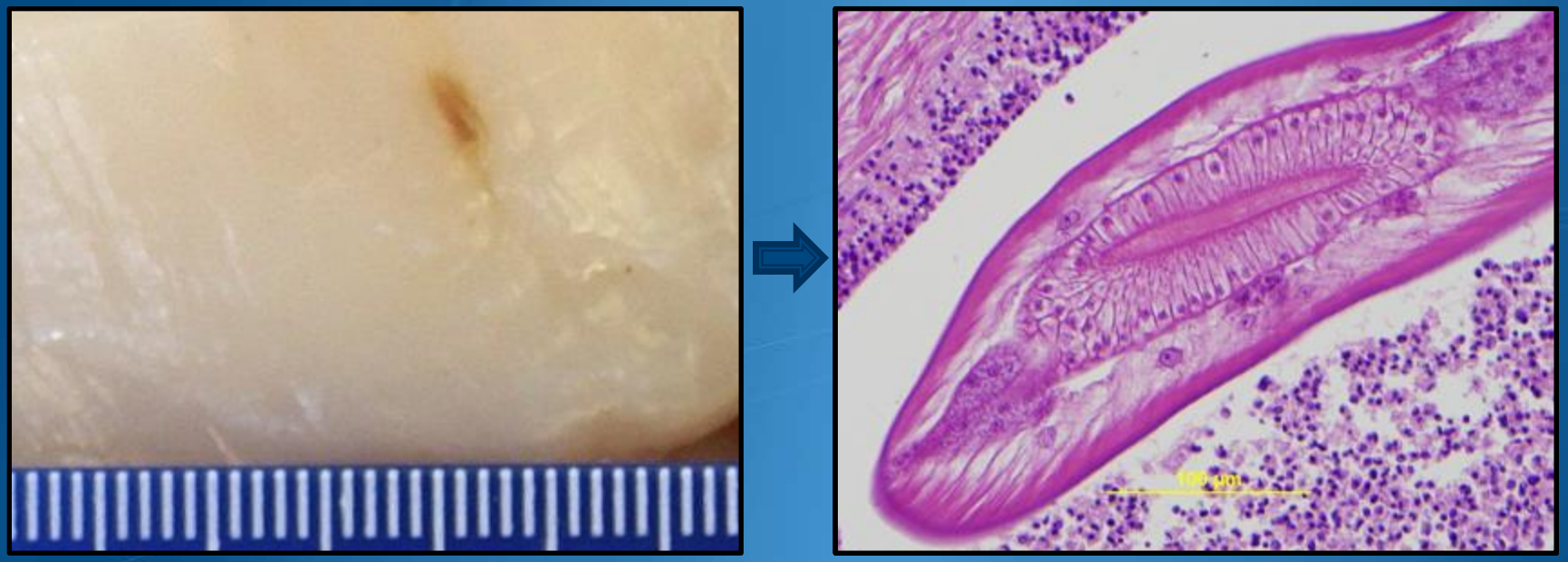
Preliminary histology



Fourth stage nematode larvae coiled within brownish lesion in sea scallop adductor muscle

Preliminary identification

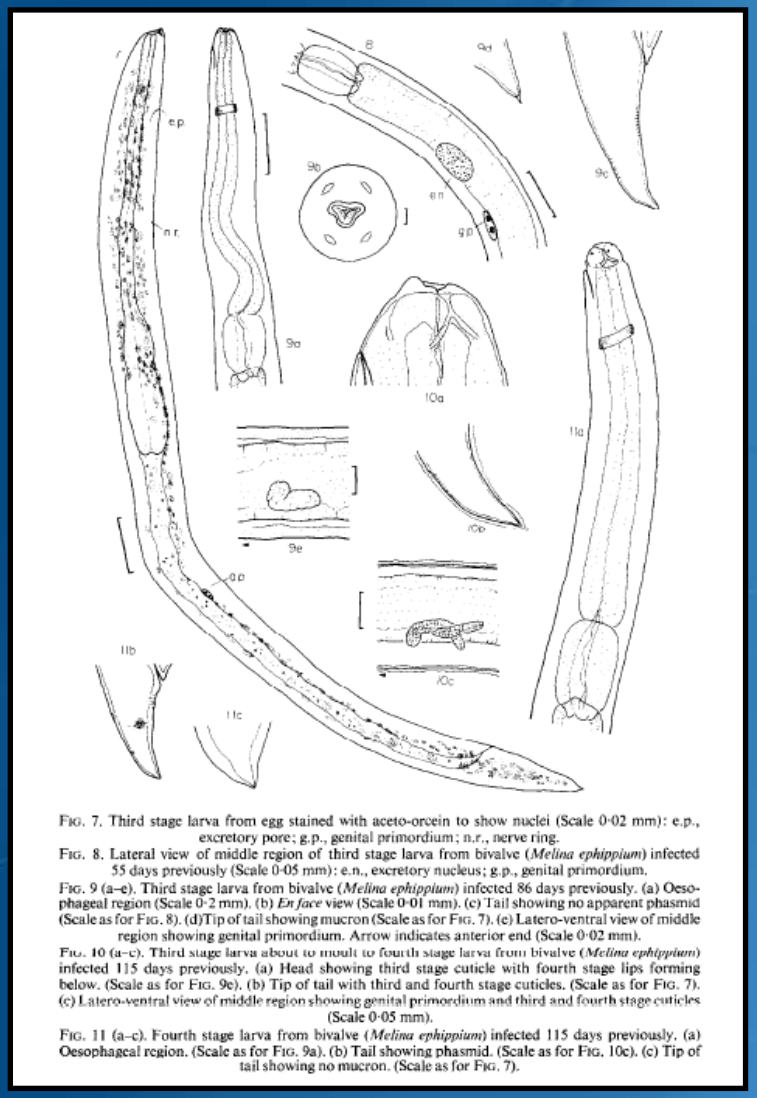


FIG. 7. Third stage larva from egg stained with aceto-orcein to show nuclei (Scale 0·02 mm): e.p., excretory pore; g.p., genital primordium; n.r., nerve ring.

FIG. 8. Lateral view of middle region of third stage larva from bivalve (*Melina ephippium*) infected 55 days previously (Scale 0·05 mm): e.n., excretory nucleus; g.p., genital primordium.

FIG. 9 (a–e). Third stage larva from bivalve (*Melina ephippium*) infected 86 days previously. (a) Oesophageal region (Scale 0·2 mm). (b) *En face* view (Scale 0·01 mm). (c) Tail showing no apparent phasmid (Scale as for FIG. 8). (d)Tip of tail showing mucron (Scale as for FIG. 7). (e) Latero-ventral view of middle region showing genital primordium. Arrow indicates anterior end (Scale 0·02 mm).

FIG. 10 (a–c). Third stage larva about to moult to fourth stage larva from bivalve (*Melina ephippium*) infected 115 days previously. (a) Head showing third stage cuticle with fourth stage lips forming below. (Scale as for FIG. 9e). (b) Tip of tail with third and fourth stage cuticles. (Scale as for FIG. 7). (c) Latero-ventral view of middle region showing genital primordium and third and fourth stage cuticles (Scale 0·05 mm).

FIG. 11 (a–c). Fourth stage larva from bivalve (*Melina ephippium*) infected 115 days previously. (a) Oesophageal region. (Scale as for FIG. 9a). (b) Tail showing phasmid. (Scale as for FIG. 10c). (c) Tip of tail showing no mucron. (Scale as for FIG. 7).

From Berry and Cannon, 1981

- Etiology and preliminary histology **SUGGEST** a nematode in the genus , *Sulcascaris*.
- Many species, however likely to be *Sulcascaris sulcata* .
- This species is cosmopolitan and has been identified in many genera of bivalve molluscs.
- Saucer scallop (Aus.), Calico scallop (US), Surf clams (US).
- Similar ephemeral observation of similar affected sea scallops was reported in May 2003.

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Sulcascaris sulcata life cycle

- Assuming identification, the life cycle of *Sulcascaris sulcata* involves two hosts.
- Adult nematodes attach to the esophagus of Loggerhead and Green sea turtles.
- Eggs pass through the GI tract and enter the benthos via the feces.
- Eggs are filtered by benthic molluscs and the larval stages (1-4) develop.
- Fourth stage larvae are ingested by turtles.

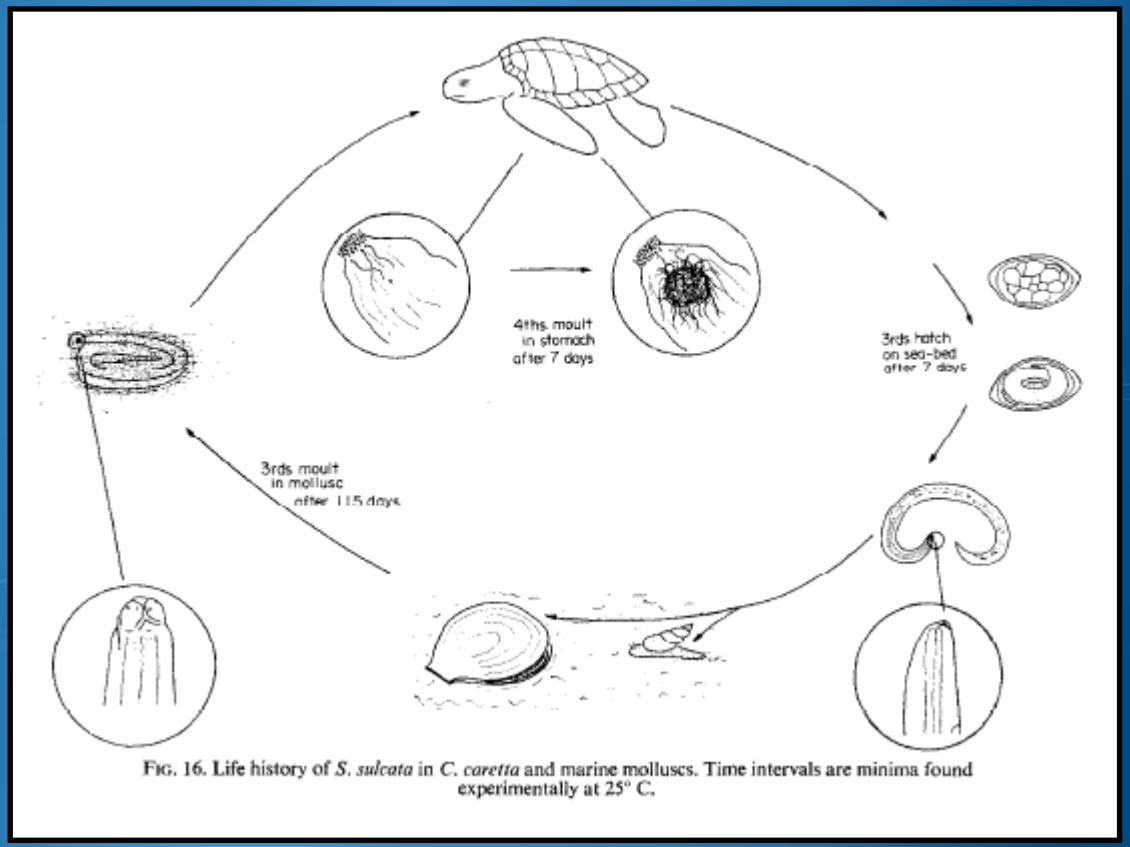

FIG. 16. Life history of *S. sulcata* in *C. caretta* and marine molluscs. Time intervals are minima found experimentally at 25° C.

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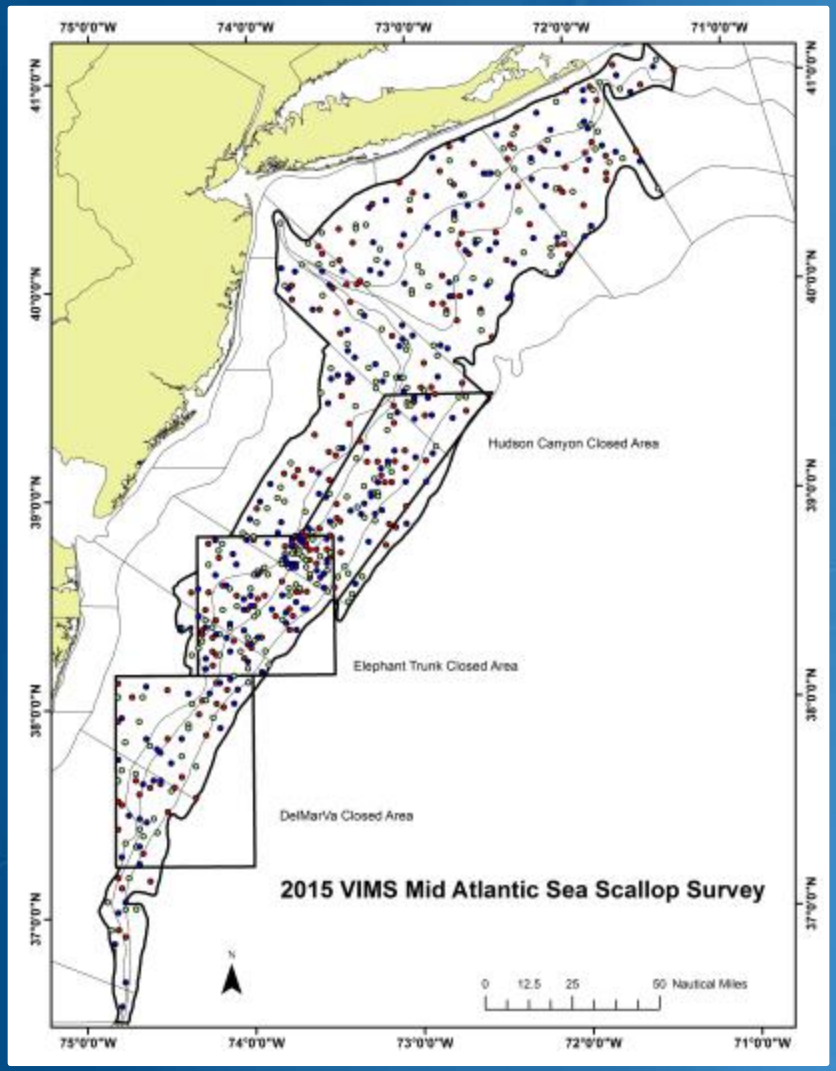
Parasite surveillance



- The VIMS MAB survey commenced soon after reports of the affected scallops began to appear.
- Increased sampling to answer:
  - What is it?
  - Where is it located?
- Expanded the scallop biological sampling to attempt to capture the spatial extent of the parasite as well prevalence and intensity information.
- Sampled 10-15 animals at every station that had scallops .
  - Histological and genetic samples.

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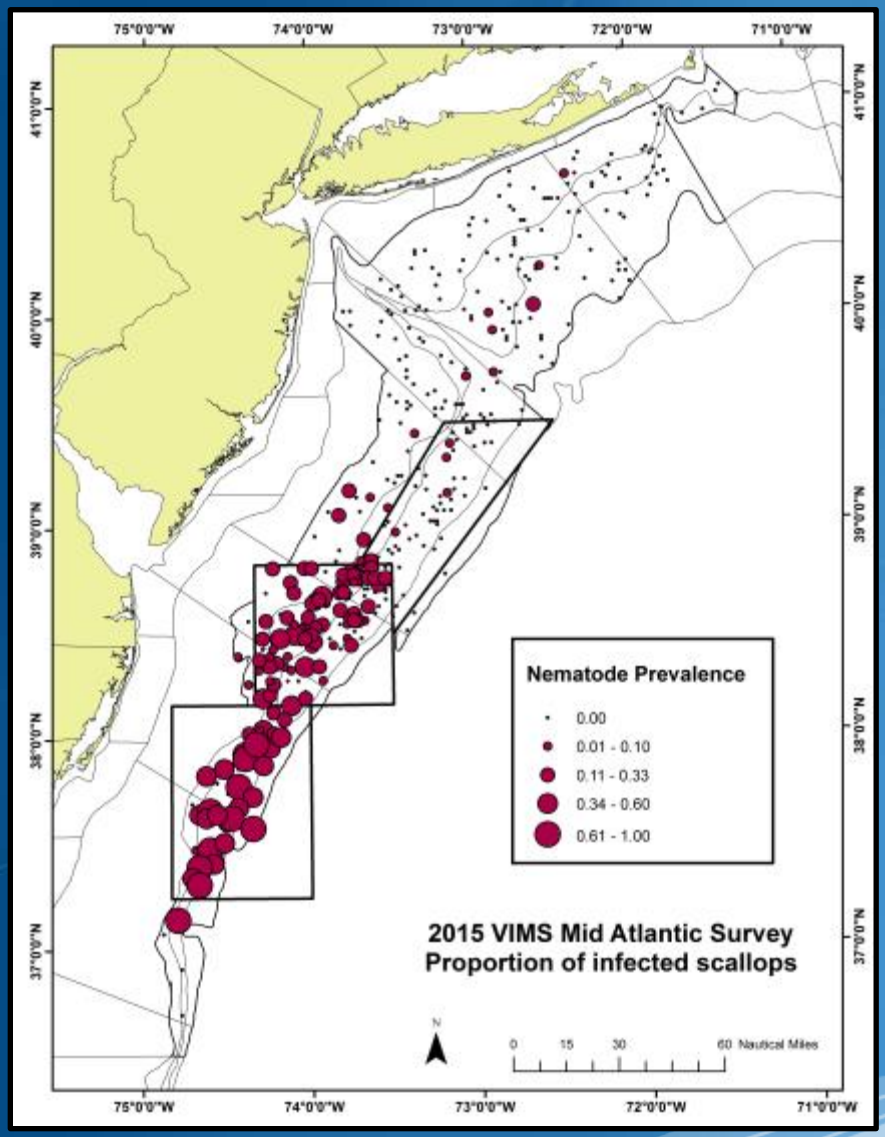
Nematode Prevalence



- Spatial distribution of the prevalence of the parasite in the sampled scallops.
- For each station with sampled scallops, a proportion of the sample that contained at least one nematode was calculated.
- Intensity appears to increase as a function if decreasing latitude.
- At this time, sporadic occurrence north of the ETCA.

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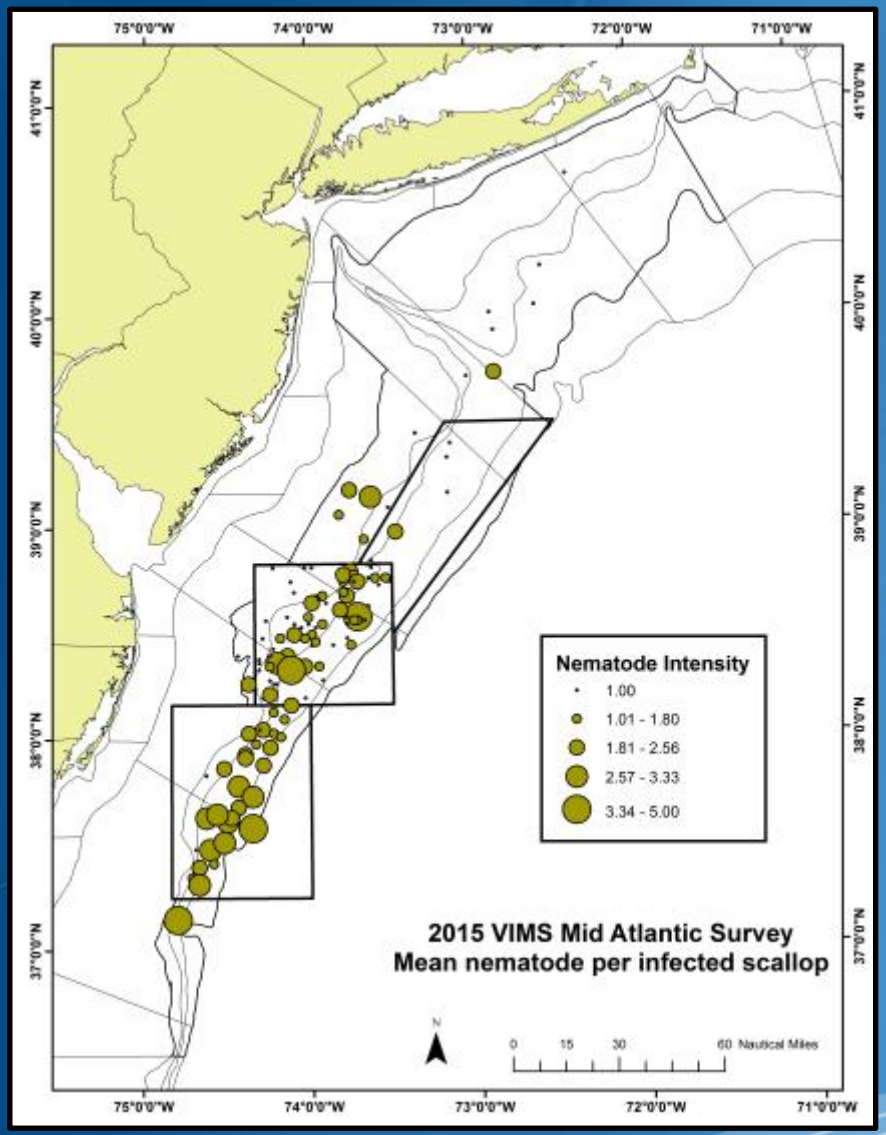
Nematode Intensity



- Spatial distribution of the intensity of the parasite in the sampled scallops.
- For each positive identification at a given station, the mean number of nematodes per scallop was calculated.
- Intensity appears to increase as a function if decreasing latitude.

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Summary

- Definitively identify parasite (one, multiple) using taxonomic and genetic techniques.
- Understand the biology of the parasite and how it affects the host(s).
- Impact on fishery.
  - Clear overlap with the core of the current scallop biomass and the highest prevalence and intensity of the parasite.
  - In May of 2003, reports waned over time and there were no additional reported sightings until 2015.

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