Tanais stanfordi Richardson 1901 (Crustacea, Tanaidacea) from the Fraser River Estuary, British Columbia

C. D. LEVINGS

Department of Fisheries and the Environment, Pacific Environment Institute, 4160 Marine Drive, West Vancouver, British Columbia, Canada V7V 1N6

AND

F. RAFI

National Museum of Natural Sciences, Ottawa, Ontario, Canada K1A 0M8

Accepted August 2, 1977

Tanais stanfordi Richardson 1901 was observed at a number of estuarine localities in British Columbia, extending the known range of the species in the Pacific from Clipperton Island and the Kuriles. On the Fraser River estuary, abundance data ranged up to 17,400 individuals 0.25 m^{-2} and 2 856 mg wet wt. 0.25 m^{-2}. Abundance decreased with increasing grain size of sediments. *T. stanfordi* is potentially available to predators in estuarine food webs, but knowledge of interactions is incomplete.

KEY INDEX WORDS: *British Columbia, ecology, estuary, Fraser River, Tanaidacea,* Tanais stanfordi.

Syesis, 11:51–53 (1978)

During surveys to describe intertidal communities on various estuaries in British Columbia, the first author has encountered *Tanais stanfordi,* hitherto unknown from the West Coast of continental North America. In his recent review of the species, Gardiner (1975) assumed the species was cosmopolitan in distribution, and our findings add support to this contention. The major purpose of this note is therefore to document a range extension for *T. stanfordi* from Clipperton Island (Lat. 10°20′N, Long. 109°13′W) and the Kuriles, which are the only other recorded localities in the North Pacific. Some ecological data on the species' relationship to temperature, salinity, and sediment type are presented from field work on the Fraser River estuary in southwestern British Columbia.

T. stanfordi has been observed at a number of estuarine localities in British Columbia, including the following: Fraser River estuary (Levings and Coustalin 1975; Otte and Levings 1975); Squamish River estuary and adjacent Howe Sound (Levings and McDaniel 1976), and the Kitimat River estuary (Levings 1976). Data reports cited above contain information on sampling methods, detailed environmental information, and accompanying biota.

Environmental conditions and relationship with sediment type

The intertidal stations where *T. stanfordi* was recorded were at higher elevations (over 2 m above chart datum) on estuarine beaches. Substrata ranged from very fine silt to coarse sand (median grain size 12 to 290 μm). At stations where *T. stanfordi* was recorded, salinities of overlying water ranged from 3.7 ‰ to 22.7 ‰, and sediment temperatures (upper 5 cm) from −2.0 C to 23.5 C. As Gardiner (1975) pointed out, the species exhibits very wide tolerances for temperature and salinity as judged from its distribution.

There was a negative relationship ($r = 0.56$) between grain size and abundance of *T. stanfordi* on the Fraser estuary (Fig. 1). Finer sediments (mud, silt) are apparently required for the species to build tubes, as abundance was reduced in sand.

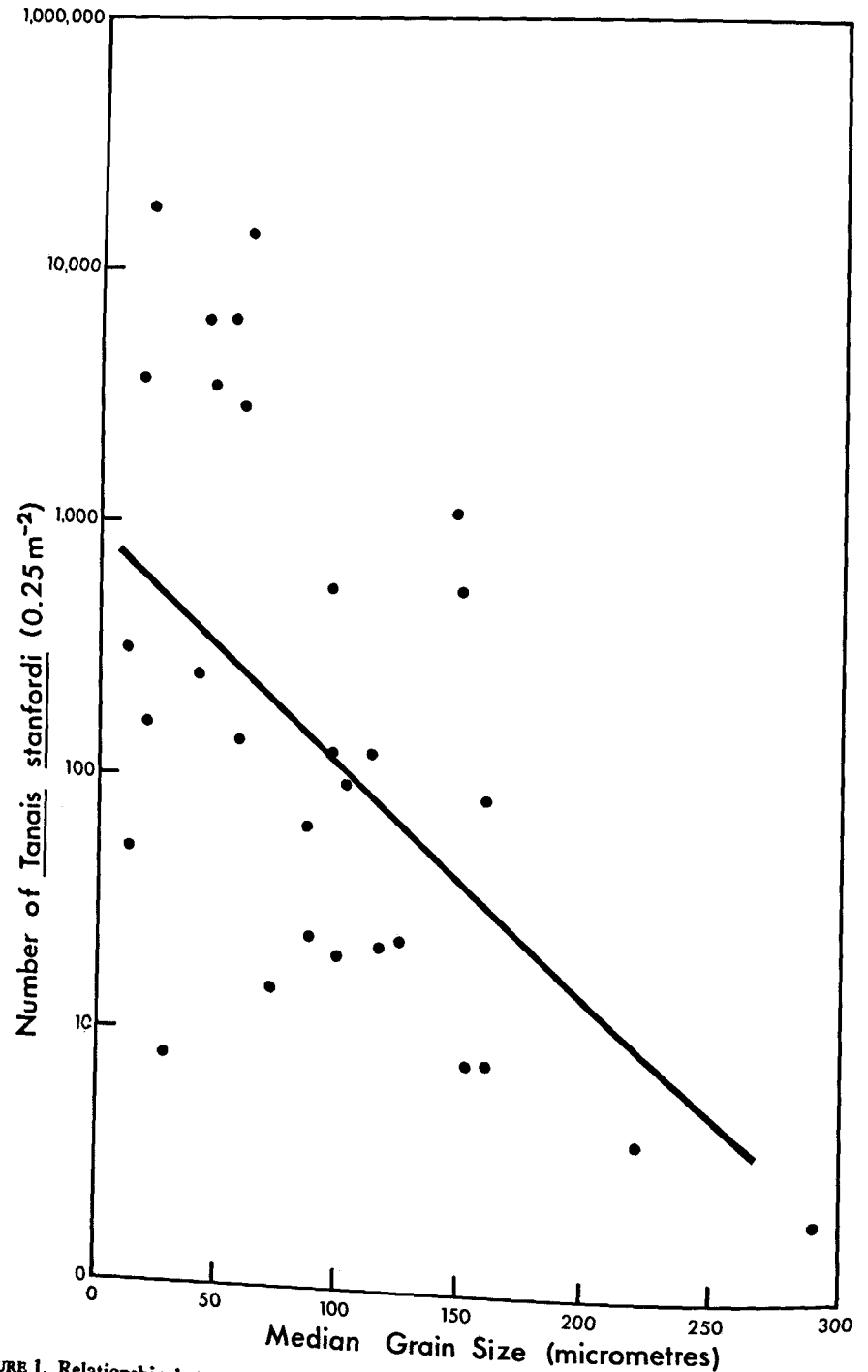

FIGURE 1. Relationship between abundance of *Tanais stanfordi* ($\log_{10}$ number 0.25 m^{-2}) and median grain size (μm). Data from 30 stations on the Fraser River estuary (29 from Levings and Coustalin 1975; one from Otte and Levings 1975). The regression line ($\log Y = -0.0095\ X + 3.0901$) between the two variables is also shown.

Abundance and associated species

Tanais stanfordi was one of the more abundant and common organisms encountered in our surveys of estuarine beaches. On the Fraser estuary, at 19 stations with median grain size less than 100 μm, numerical abundance ranged from 8 to 17,400 individuals 0.25 m^{-2} (mean = 2893, S.D. = 4924), and biomass from <1 to 2856 mg wet wt. 0.25 m^{-2} (mean = 605, S.D. = 945). *T. stanfordi* accounted for 0.4 to 87.9 per cent of numerical data and 0.02 to 61.4 per cent of biomass data. Species associated with *T. stanfordi* include a variety of estuarine invertebrates, notably the sabellid polychaete *Manayunkia aestuarina* (Bourne), the amphipods *Corophium salmonis* Stimpson and *C. insidiosum* Crawford, and the bivalve *Macoma inconspicua* (Broderip and Sowerby).

Another tanaid, *Leptochelia dubia* Kröyer, occurs on the Fraser estuary and has frequently been reported from the northeast Pacific (e.g., Hatch 1947). This species was not reported from any stations where we found *T. stanfordi*, but was common at lower elevations (<2 m above chart datum) on the southern part of Roberts Bank in the Fraser River estuary, in the vicinity of eel grass (*Zostera marina*) beds. At these seven stations, numerical abundance of *L. dubia* ranged from 32 to 1 034 0.25 m^{-2} (mean = 366, S.D. = 382) and biomass from 2 to 2 330 mg wet wt. 0.25 m^{-2} (mean = 423, S.D. = 848).

Ecological function

The role of tanaids in estuarine food webs is of interest, since the ecological surveys conducted by the first author provide data on food supplies for predators (fish, birds) of commercial or aesthetic significance. There is no evidence that *Tanais stanfordi* is utilized as a food source for juvenile salmonids at estuarine environments, in spite of relatively thorough sampling (e.g., Goodman 1975). Sampling for shore birds and bottom feeders such as flatfish has not been intensive. The species is apparently potentially available for juvenile salmon, as it is able to move into the water column at high tide. *T. stanfordi* was recorded at 7 out of 21 plankton tow stations (maximum depth 4 m) over Sturgeon Bank, Fraser River estuary (Levings and Coustalin 1975). Whether this is an active or passive movement at high tide has not been determined.

Other crustaceans (e.g., *Corophium* spp. and harpacticoid copepods) living with *T. stanfordi* are part of fish diets. Interactions between these smaller benthic organisms and meiofauna would therefore be of interest in future studies. As Elmgren (1976) pointed out, knowledge of predator-prey relationships among such small invertebrates is essential for prediction of function at higher trophic levels.

Thanks are due to Lita Greve Jensen, University of Bergen, Norway, who initially identified *T. stanfordi* from Fraser estuary samples.

ELMGREN, R. 1976. Baltic benthos communities and the role of the meiofauna. Asko Laboratory and Dept. of Zoology, Univ. of Stockholm, 1976. 28 pp.

GARDINER, L. F. 1975. A fresh and brackish-water tanaidacean, *Tanais stanfordi* Richardson 1901, from a hypersaline lake in the Galapagos Archipelago, with a report on West Indian specimens. Crustaceana **29**:127–139.

GOODMAN, D. 1975. Impacts of the proposed expansion of the Vancouver International Airport and other developments on the fisheries resources of the Fraser River estuary. Dep. Fish. Environ., Fish. Mar. Ser., Vancouver, Canada. 158 pp.

HATCH, M. H. 1947. The Chelifera and Isopoda of Washington and adjacent regions. Univ. Wash. Pub. Biol. **10**:55–274.

LEVINGS, C. D., and J.-B. COUSTALIN. 1975. Zonation of intertidal biomass and related benthic data from Sturgeon and Roberts Banks, Fraser River estuary, British Columbia. Dep. Fish. Environ., Fish. Mar. Ser., Res. Dev. Directorate, Canada. Tech. Rep. No. 468. 138 pp.

——— and N. G. MCDANIEL. 1976. Industrial disruption of invertebrate communities on beaches in Howe Sound, B.C. Dep. Fish. Environ., Fish. Mar. Ser., Res. Dev. Directorate, Canada. Tech. Rep. No. 663. 95 pp.

——— ——— 1976. Intertidal invertebrates and habitats at the Kitimat River estuary. Fish Res. Board Can. MS Rep. No. 1397. 15 pp.

OTTE, G., and C. D. LEVINGS. 1976. Distribution of macroinvertebrate communities on a mud flat influenced by sewage, Fraser River Estuary, British Columbia. Dep. Fish. Environ., Fish. Mar. Ser., Res. Dev. Directorate, Tech. Rep. No. 476. 63 pp.