production rates for macroinvertebrates on stable substrates in the UMR. In addition, we sampled macroinvertebrates from 4 adjacent backwater lakes (Lawrence Lake, Round Lake, Target Lake, and an impounded, open-water habitat near Stoddard, WI) to compare the level of secondary productivity between the high-flow main-channel habitats and low-flow contiguous backwater habitats. The backwater habitats varied in their connectivity to the main channel of the UMR. In the spring and summer 2006, Hester-Dendy artificial substrates (HDAS), consisting of 14 Masonite® discs with a total area of 0.16 m^2, were placed at three locations (UMR River Mile 691.6, 693.3, and 699.8) along alignment structures. We also sampled backwater invertebrates from a standard area of 0.06 m^2 using a Gillespie-Brown (G-B) sampler. Three HDAS and 2 (G-B) samples were collected from each location approximately once every 4 weeks. Using image analysis software, video microscopy and empirical area-to-weight relationships, over 17,000 individual macroivertebrates were identified and measured for size. Water temperature, an important factor affecting macroinvertebrate growth and production, varied during the study period and between habitat types, but not among sites within habitats. Filter-feeding caddisflies *Hydropsyche orris* and *Cheumatopsyche campyla* (Hydropsychidae: Trichoptera) dominated the macroinvertebrate colonists on the HDAS in both number and biomass. Standing crop increased rapidly between June and July across all sites and peaked in August then declined in September. Colonization rates were greatest, averaging 200.0 to 325.0 individuals m^{-2} d^{-1}, in June and then monotonically declined to 37.5 to 56.3 individuals m^{-2} d^{-1} by September. Annual production rates for *H. orris* from UMR River Mile sites 691.6, 693.3, and 699.8 were 379.2, 350.9 and 246.6 g DW m^{-2}/yr, respectively. The amphipod *Hyalella azteca* (Amphipoda: Talitridae) dominated the macroinvertebrate community in the backwater habitats in both number and biomass. Standing crops peaked in July across all backwater sites. Annual production rates for *H. azteca* increased with habitat connectivity and ranged between 21.1 and 45.8 g DW m^{-2}/yr. These initial findings suggest that colonization and production rates for filter-feeding caddisflies on channel alignment structures and, potentially, natural, snag habitats, represent a much larger source of secondary production for main channel areas in the UMR than originally thought. Rates of production for *H. azteca* were greater in well-connected backwater habitats. Both habitats are likely sources of food for main-channel fish, however, the mode and rates of delivery are likely to differ substantially.

The role of crabs (*Macrophtlmus Japonics*) burrows on organic matter decomposition in estuarine tidal flat, Japan

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The objectives of this study are to elucidate the burrow structure and to clarify the role of burrows in material cycle in the tidal flat. In our work, we focus on the dominant species in muddy tidal flat, crab *Macrophthalmus japonicus*.

Burrow structure of *M.japonicus* was investigated on a K atsuura river tidal flat in Tokushima prefecture, Japan, using *in situ* resin casting. The study location covered area of approximately 5000 m^2. Sampling was conducted in August 2006, and a total of 48 burrow casts were obtained.

Burrows consisted mainly of J-shaped structures (98%) while the rest belonged to U-shaped structures (2%). The maximum measured burrow volume was 120 cm^3; wall surface area was 224 cm^2,while maximum burrow length and depth was 23.2 cm and 16.5 cm, respectively. Burrow volume and surface area were strongly correlated with carapace width of *M.japonicus*. Investigation of the individual number of *M.japonicus* in 13 quadrats (50×50×20 cm) was conducted using 2mm sieve. The number of *M.japonicus* was 36 ind./m^2 in August 2006. Using cohort analysis we estimated that surface area of burrows was 0.2m^2/m^2.

Oxygen consumption was measured during the period from August 2006 to July 2007 at the top 5 mm of surface sediment as well as on burrow walls at 5, 10 and 15cm intervals. Results varied 117.16 ± 17.40 to 452.77± 43.15 $mgO_2/m^2/h$, but no significant difference between oxygen

consumption and in respect to that organic matter decomposition of the surface sediment and burrow walls were observed. However, if we took into account the burrow existence (e.g. their calculated surface), the estimated organic matter decomposition was 146.12 gC/m^2/month comparing to 116.5 gC/m^2/month without burrows. This leads conclusion that organic matter decomposition increased 1.25 times, because of the expansion of the tidal flat surface area by burrowing activity. The rate of organic matter decomposition in burrow walls therefore contribution with 20.3% to organic matter decomposition in the tidal flat. These result indicated that in situ activities of *M.japonicus* significantly influences the material cycle and it is important to consider the existence of burrow in order to understand the fluxes of materials and to evaluate the purification function of the tidal flat.

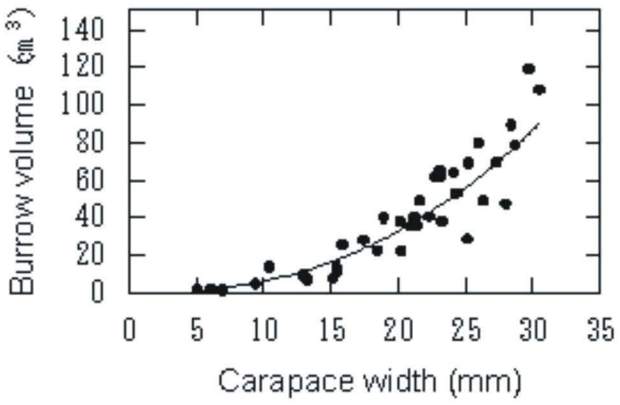

Fig.1. Relationship of carapace width with burrow volume

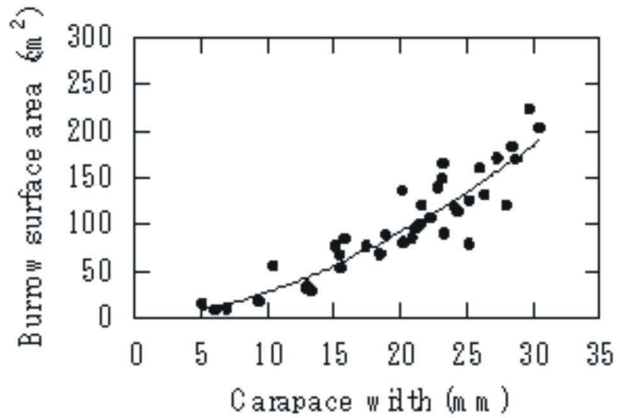

Fig.2. Relationship of carapace width with burrow surface area

Seasonal variations of fresh water residence time and their impact on the water quality at Hurun Bay, South Sumatera, Indonesia

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Hurun Bay is a semi enclosed water ecosystem that is situated at the western coastal area of Lampung Bay, southern coastal area of Sumatera and faces to the Sunda Strait (Fig.1). The environment within this area seems to be strongly influenced by monsoonal wind system that affects on the variability of the meteorological and oceanographic conditions of Lampung Bay. To understand the characteristics and control mechanism of water quality at Hurun Bay, a seasonal variations in freshwater residence time was investigated based on a series of physical (temperature, salinity), chemical (DIN; Dissolved Inorganic Nitrogen, TOM; Total Organic Matter, DIP; Dissolved Inorganic Phosphorus) and biochemical (DO; Dissolved Oxygen and phytoplankton) data observed during 2003-2004. The residence time of freshwater as indicator of the water exchange played an important role in the control of the water quality at Hurun Bay. Long freshwater residence time in both transition periods of Wet-Dry and Dry-Wet seasons has increased the DIN and TOM accumulation in the water column, and it stimulated phytoplankton bloom at Hurun Bay. This situation has caused the DO concentration decrease due to high decomposition of the organic matter. The results recommend that in both transition periods, the aquaculture activity should be limited at minimum level to reduce the risk of fish mass mortality caused by the DO depletion, diseases appearance, and particularly harmful algae bloom such as *Noctiluca sp* that appeared during these periods. DIN was a main factor of the environmental pollution at Hurun Bay due to the intervention of the anthropogenic activity through aquaculture. The DIN/DIP ratio within this area was less than 16.