

洪水流經四斑細蟪棲地蘆葦叢內流速變化

Velocity profile variations of flood through reeds of Mortonagrion Hirosei habitat

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摘 要

四斑細蟪被世界自然保護聯盟保育紅皮書列為易危物種，只生活在鹹淡水交界潮間帶的蘆葦叢濕地；淡水河下游基隆河磺港溪匯流口附近蘆葦叢內緩慢流速區域為主要棲地。颱風期間高流速洪水對於棲地可能造成衝擊使得蘆葦叢內流速改變而影響四斑細蟪存活機會，因此了解洪水流經蘆葦叢的流速變化為保育四斑細蟪重要先期研究。根據基隆河磺港溪匯流口附近蘆葦叢現地調查結果，本研究於 30 cm 寬試驗水槽內設置 2 種高度圓形壓克力條(25 及 35 cm)以模擬蘆葦叢，並考慮 2 種水深(25 及 45 cm)與 2 種流速(驅動水流葉片轉速 860 及 1750 rpm)，共計 8 組條件進行模型試驗；並利用聲波都普卜勒速度剖面儀(Vectrino Profiler, Nortek)量測不同位置流速剖面。歸納流速量測結果發現當水深等於及低於蘆葦叢高度時，蘆葦叢內各位置平均流速微幅增加；此外當水深低於蘆葦叢高度且較高流速流入時，蘆葦叢下層流速呈現加速，此流況對於四斑細蟪所處緩慢流速棲地環境造成負面

影響。當水深高於蘆葦叢時，蘆葦叢以上流速呈現加速情況，而蘆葦叢內則為減速；相同入流流速時，水深愈高於蘆葦叢則減速效果愈明顯，如此流況對於四斑細蟪於颱洪期間的存活率有正面助益。本研究成果為後續四斑細蟪棲地蘆葦叢流況特性探討基礎，並可做為四斑細蟪棲地復育的重要參考。

關鍵詞：四斑細蟪、蘆葦叢、流速剖面、聲波都卜勒流速剖面儀

ABSTRACT

Mortonagrion Hirosei is a near threatened species in IUCN Red List. Mortonagrion Hirosei lives only in reeds of tide-effect wetland. It found at confluence areas of the Keelung River and Haungong River, where the water flows very slowly. Floods with high flow velocity will have strong impacts to habitat of Mortonagrion Hirosei and influence survive. It would be crucial to understand velocity variations of flood going through reeds. In this study, flume experiments in laboratory, NTU, were carried out in a 30 cm-wide straight flume. According the field investigations at the confluence areas of the Keelung River and Haungong River, two reed heights (25 and 35 cm), two water depths (25 and 45 cm) and two flow velocities (propeller rotation speed 860 and 1750 rpm) were considered. Acoustic Doppler Velocimetry Profiler (Vectrino Profiler, Nortek) was used to measure velocity profiles at various sites of flow direction. The experimental results showed that the average velocities increased slightly in reeds as water depth equal to and less than reed height. In addition, higher approaching velocity induced flow accelerate near reed bottom. These conditions were negative to survive of Mortonagrion Hirosei during flood. As water depth more than reed height, the velocities above reeds increased and decreased in reeds. The velocity accelerations above reeds and decelerations in reeds were more significantly as water depth higher than reeds. These conditions were positive to survive of Mortonagrion Hirosei during flood. This study will be basic researches for Mortonagrion Hirosei restorations.

Keywords: Mortonagrion Hirosei, Reeds, Velocity profile, Acoustic Doppler Velocimetry Profiler