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Grass and water preference during oviposition by *Sympetrum pedemontanum elatum* in Japan (Odonata: Libellulidae)

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Abstract. *Sympetrum pedemontanum* is regionally endangered or extinct in several countries despite having a wide distribution across the Eurasian continent and its neighboring islands. Its subspecies *S. p. elatum* in Japan has been decreasing rapidly with the loss of larval habitat in rural areas since the 1970s. Previous studies have detailed habitat use by larvae and mature adults, but information on grass and water preferences during oviposition is still lacking. In this study, we tracked adults as they performed reproductive behaviors and documented the grass height and water conditions preferred for oviposition in a lowland, mid-slope river in Japan. Our results showed that females dipped their abdomens significantly more into stagnant than into flowing water for oviposition and that short surrounding grass and shallow water enhanced oviposition behavior. These findings emphasize the importance of riparian grass management and water flow regulation for the conservation of *S. p. elatum*.

Further key words. Dragonfly, Anisoptera, conservation, microhabitat use, semi-natural grasslands, reproductive behavior, tandem formation

Introduction

To conserve aquatic insects, it is important to understand their microhabitat use (*e.g.*, Samways 1994: 91, 114 ff; New 1995: 40 f; Sheldon et al. 2002; Hykel et al. 2017). Especially for dragonflies, larval (Pierce 1988; Fincke 1992, 1996; Fox & Cham 1994; Higashikawa et al. 2016), pre-mature adult (Ubukata 1973), mating (Ueda 1979), and oviposition stages (Ubukata 1984; Buskirk & Sherman 1985; Wildermuth 1994) should each be evaluated because of habitat use changes that occur as individuals develop.

Sympetrum pedemontanum (Müller in Allioni, 1776) is endangered in most European countries, even though it is widely distributed across the Eurasian continent and its neighboring islands (Popova 2004; Kalkman 2014; Higashikawa et al. 2016, 2017). It often inhabits riverbeds along slowly flowing rivers, rice paddy fields, and semi-natural grasslands in rural agricultural landscapes (Taguchi & Watanabe 1985; Lockwood 2007; Higashikawa et al. 2016, 2017).

Sympetrum pedemontanum elatum (Selys, 1872) differs from the nominotypical subspecies in the structure of the anal appendages of adult males (Popova 2004). Although it was historically one of the most common darters and abundant in traditional agricultural landscapes called »satoyama« until the 1970s (Ishida et al. 1988: 113; Kadoya et al. 2009; Aoki 2013), it is today highly threatened in Japan (Kawachino 2015; Higashikawa et al. 2016, 2017) and listed as »Extinct« in Chiba Prefecture, »Critically Endangered« in Nagasaki Prefecture, »Vulnerable« in Tokyo Metropolis, and »Near Threatened« in eight other prefectures in Japan (Association of Wildlife Research and EnVision 2017).

In western Honshu, *S. p. elatum* passes winter in the egg stage (Yagi et al. 2006; Ozono et al. 2013: 404). Young larvae then appear in stagnant water in March and move to slowly flowing water as they grow from April to July (Higashikawa et al. 2016). Adults emerge in July and reside on short grass near water until they mature from August to September (Ishida et al. 1988: 113 ff; Aoki 1998: 88, 2013; Ozono et al. 2013: 405). Mature adults then fly above or perch on short, uniform height grass (Higashikawa et al. 2017) and perform reproductive behaviors until they die off in November (Yagi et al. 2006; Ozono et al. 2013: 404).

The microhabitat use of *S. p. elatum* larvae has been well studied by Higashikawa et al. (2016), who suggested that the dragonflies change their microhabitat use by season as they develop, from stagnant water at the water's edge to weakly flowing water, and that changes in agricultural water management in the 1970s may have deprived them of specific larval habitat. After emergence, immature adults reside on short grass near the water until sexual maturation, contrary to many other *Sympetrum* species in Japan, which undertake a pre-mature migration into the forests or hilly grasslands (Ishida et al. 1988: 113 ff; Aoki 1998: 88, 2013; Ozono et al. 2013:

405 f). Grass use by mature adults for mating has also been reported by Higashikawa et al. (2017), who identified a preference by the dragonflies for short, uniform height grass suggesting the importance of regular grass trimming along riverbeds for the conservation of this species.

However, no quantitative study has been done on the water and grass preferences of *S. p. elatum* adults for oviposition, which may also be crucial for the conservation of this species. Indeed, oviposition site selection by dragonflies is thought to be critical for larval survivorship (Ubukata 1984; Buskirk & Sherman 1985; Wildermuth 1994; Lancaster & Downes 2013: 173). However, there is a contradiction in our knowledge of this process in that young larvae of *S. p. elatum* are usually found in stagnant water (Higashikawa et al. 2016), yet this species is said to be lotic (Ishida et al. 1988: 113; Aoki 1998: 88; Kondo et al. 2005: 78; Inoue & Tani 2010: 56; Muraki 2010). Investigating water condition preferences of *S. p. elatum* during oviposition would provide a mechanism for the micro-distribution of young larvae of this subspecies described in Higashikawa et al. (2016).

In this study, we recorded the sequential behaviors of *S. p. elatum* from tandem formation to oviposition. We measured preferred grass height and observed preferred water conditions where these behaviors occurred in a lowland, mid-slope river in Japan. We then statistically compared the number of abdominal dips by tandem pairs between stagnant and flowing water with water depth and surrounding grass height as covariates.

Material and methods

Study site

The study was conducted at the Sakasegawa River, Takarazuka City, Hyogo Prefecture, Japan (34°79'N, 135°34'E; 60–90 m a.s.l.; average slope 3.7 %; Fig. 1a). Grass on the river banks, including *Phragmites japonicus* Steud. (Poaceae), which is dominant and generally grows over 2.0 m, is cut late every spring in this river to be maintained short during the summer (Fig. 1b). Sakasegawa River is one of the remaining prime habitats of *S. p. elatum* where the population has stably contained more than 18 000 adults in recent years (Yagi 2005; Yagi et al. 2006; Adachi et al. 2007; Fujii et al. 2008; Inoue & Tani 2010: 128).

We set up two observation plots where many adults had been observed exhibiting reproductive behaviors (Fig. 1a). Streams in these plots were separated into several shallow and small rills, each which had plenty of stagnant water at the water's edge. In the plots, male and female adults were typically observed perching on grass or flying at 10–100 cm height before tandem formation (Annex 1), although those flying in grass greater than 100 cm tall (left side of Fig. 1b) were poorly visible.

Grass height measurements and evaluation of water conditions used for copulation and oviposition by *S. p. elatum* tandem pairs

Adults were observed from 9:00 to 11:30 h JST (UTC +9), when they were most actively exhibiting reproductive behavior, on seven sunny days between 09-ix-2017 and 08-x-2017. We waited for tandem pairs newly arriv-

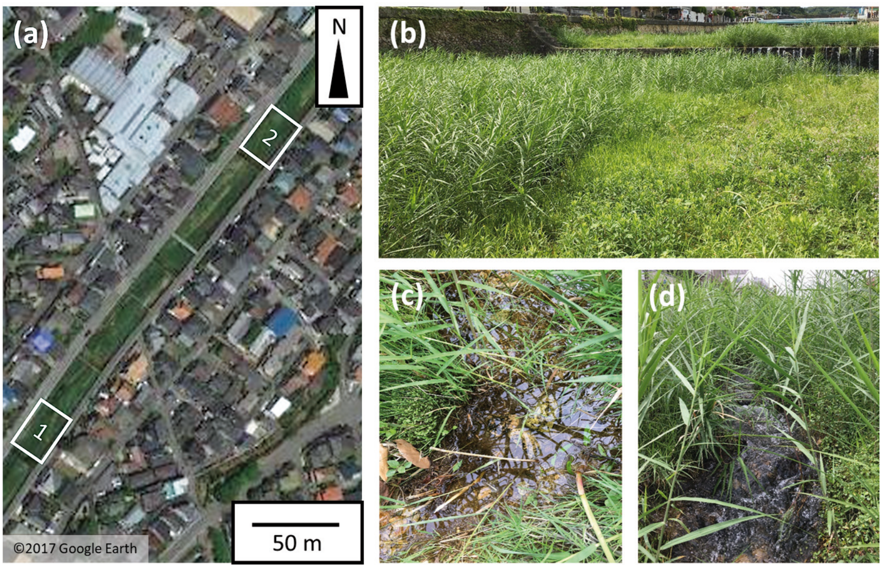

Figure 1. Location of observation plots in the Sakasegawa River, Takarazuka City, Hyogo Prefecture, Japan. (a) Large-scale view of the two observation plots indicated with squares (plot 1: 34°7930'N, 135°3447'E; plot 2: 34°7946'N, 135°3461'E). (b) Ground-level view of plot 1. Grass height is greater (100–170 cm) on the left side compared to the right side (10–40 cm) because of a better water supply. (c–d) Oviposition spots over (c) stagnant and (d) flowing water.

ing at the water and observed them from copulation to oviposition. First, the perching height of copulating tandem pairs was measured, and the mating duration of the pairs was also recorded. Next, we counted the number of abdominal dips exhibited by tandem pairs and noted the location of oviposition spots. These oviposition spots were categorized as being in stagnant (S – water with mean velocity less than 1.5 cm/s) or flowing water (F) by visual observation (Fig. 1b, c, Annex 2). Additionally, we measured water depth and the height of five randomly selected grasses on circumference of 0.6 m diameter circles centered on each oviposition spot; some measurements were however not taken due to limited observation time. On other days, we measured water flow velocity at 20 locations where abdominal dips by tandem pairs were observed. These locations partly included oviposition spots used for counting of abdominal dips, and had also been categorized as S or F in advance (Annex 3).

Comparison of the number of abdominal dips by *S. p. elatum* tandem pairs during oviposition between stagnant and flowing water

To evaluate water condition preference during oviposition, we compared the number of abdominal dips by *S. p. elatum* tandem pairs between S and F using a generalized linear mixed model (GLMMs) in IBM SPSS Statistics (version 22). The dependent variable was the number of abdominal dips by tandem pairs at each oviposition spot on each day modeled as a Poisson distribution with a log-link function and plot and date were included as random variables. Oviposition spots over water 15 cm deep ($n = 4$) were considered outliers (Fig. 4) and eliminated from the analysis. We selected the best and the second-best models on the basis of the Akaike information criterion (AIC) (Table 1).

Results

The raw data as well as means and standard deviations (SDs) of each variable can be viewed in Annex 1, 2, and 3. Fifty-two tandem pairs were observed in total, but we were unable to observe any pair completely from coupling to separation. Ultimately, we observed 33 copulating pairs and were able to record the mating duration for 21 pairs. Additionally, we identified 34 oviposition spots. Most pairs perched on grass 10–60 cm tall within 3 m from

Table 1. Akaike information criteria (AICs) and delta-AICs for all possible models explaining variation in the number of abdominal dips by *Sympetrum pedemontanum elatum* at different oviposition sites in Hyogo Prefecture, Japan, using the fixed variables. Models are listed from low to high AIC. The abbreviations S, F, G, and D respectively indicate stagnation, flowing water, mean grass height around oviposition spot, and water depth.* indicates an interaction between fixed variables.

Fixed variables	AIC	delta-AIC
S vs. F, G	317.53	0
S vs. F, G, D	319.75	2.22
S vs. F, G, D, S vs. F*D	324.06	6.53
S vs. F, G, S vs. F*G	327.65	10.12
S vs. F, G, D, G*D	329.28	11.75
S vs. F, G, D, S vs. F*G	329.39	11.86
S vs. F, G, D, S vs. F*D, G*D	334.20	16.67
S vs. F, G, D, S vs. F*G, S vs. F*D	334.77	17.24
S vs. F, G, D, S vs. F*G, G*D	338.14	20.61
S vs. F, G, D, S vs. F*G, S vs. F*D, G*D	343.42	25.89
G, D	459.59	142.06
G, D, G*D	474.02	156.49
G	587.06	269.53
S vs. F, D	636.65	319.12
S vs. F, D, S vs. F*D	639.47	321.94
S vs. F	667.85	350.32
D	807.47	489.94
Null model	1121.7	804.17

the water's edge (Fig. 2) and copulated for 160–600 seconds (Annex 2). *Sympetrum pedemontanum elatum* tandem pairs oviposited into nearby water that was 1–21 cm deep with a velocity ranging 0–16 cm/s and surrounded by 9–107 cm tall grass (Fig. 3, Annex 2).

The number of abdominal dips into the water by tandem pairs during oviposition tended to be relatively high in shallow water surrounded by short grass (Figs 4, 5). Specifically, the number of abdominal dips was significantly higher in stagnation (S) than in flowing water (F) with mean grass height around oviposition spot (G) having a significant negative effect in the best model (Fig. 6, Table 2). The effects of S *vs* F and G were also significant in the second-best model, and water depth (D) had a slightly negative significant effect (Table 2).

Discussion

Higashikawa et al. (2017) found that short grass was preferred by mature *Sympetrum pedemontanum elatum* adults during copulation, and likewise

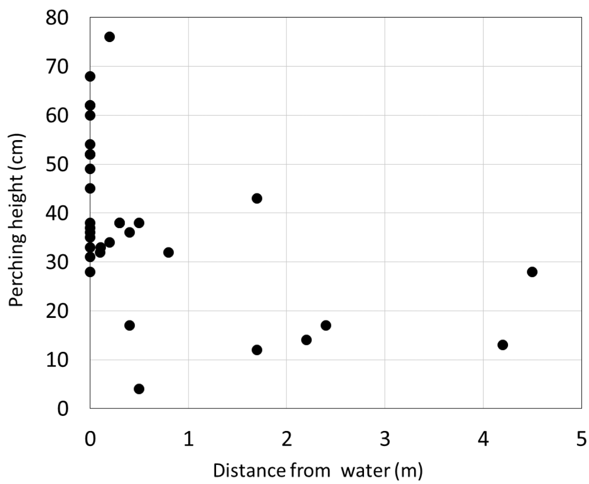

Figure 2. Perching height against distance from water for *Sympetrum pedemontanum elatum* tandem pairs during copulation in Hyogo Prefecture, Japan (n = 33). Two points are overlapping at (0.3, 38), (0, 52), and (0, 62).

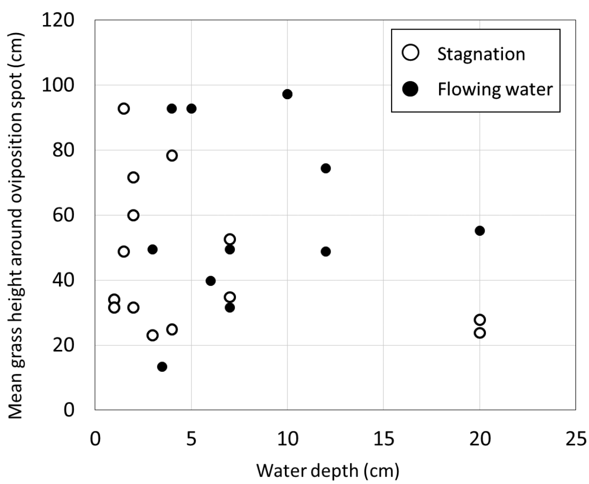

Figure 3. Mean grass height against the water depth of oviposition spots of *Sympetrum pedemontanum elatum* tandem pairs in Hyogo Prefecture, Japan.

we found that this habitat was also preferred for oviposition. This may be because tall grass over 100 cm in height may inhibit visibility of males for searching for females and thus reduce opportunity for oviposition. Additionally, because most of the remaining habitats of *S. p. elatum* in Hyogo Prefecture, Japan, are restricted to grass-managed rivers (Yagi et al. 2006), regular grass trimming may be crucial for adult presence and the reproductive success of this endangered species. On the other side, *S. p. elatum* adults do not use bare fields (Higashikawa et al. 2017), indicating that extreme grass cutting during the adult period may also have a negative effect on oviposition.

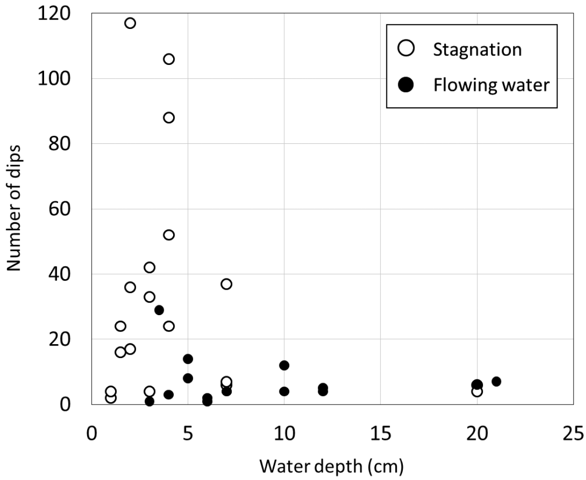

Figure 4. Number of abdominal dips into the water by *Sympetrum pedemontanum elatum* tandem pairs during oviposition against the water depth of oviposition spots in Hyogo Prefecture, Japan. There are two points overlapping at (7, 4) (both over flowing water) and (20, 6) (one over stagnant and one over flowing water).

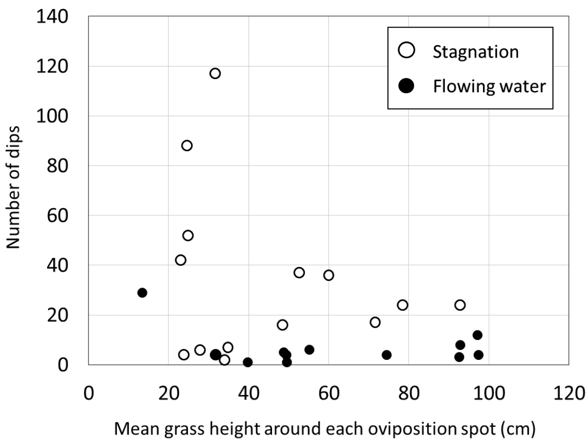

Figure 5. Number of abdominal dips into the water by *Sympetrum pedemontanum elatum* tandem pairs during oviposition against mean grass (n = 5) height around each oviposition spot in Hyogo Prefecture, Japan.

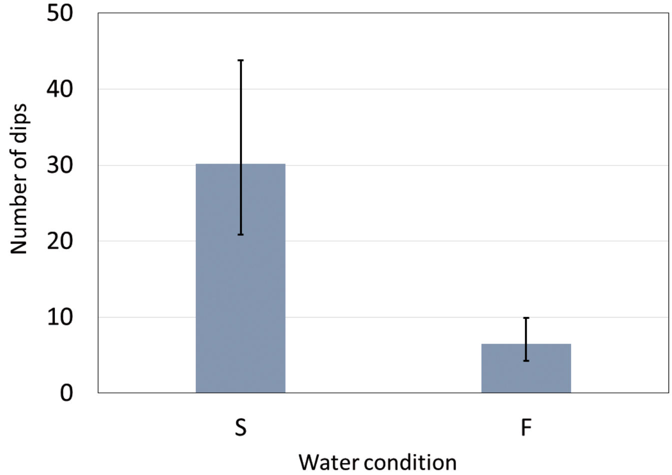

Figure 6. Estimated mean number of abdominal dips into stagnant (S) and flowing (F) water by *Sympetrum pedemontanum elatum* tandem pairs in Hyogo Prefecture, Japan during oviposition based on the best model. Vertical lines indicate 95 % confidential intervals.

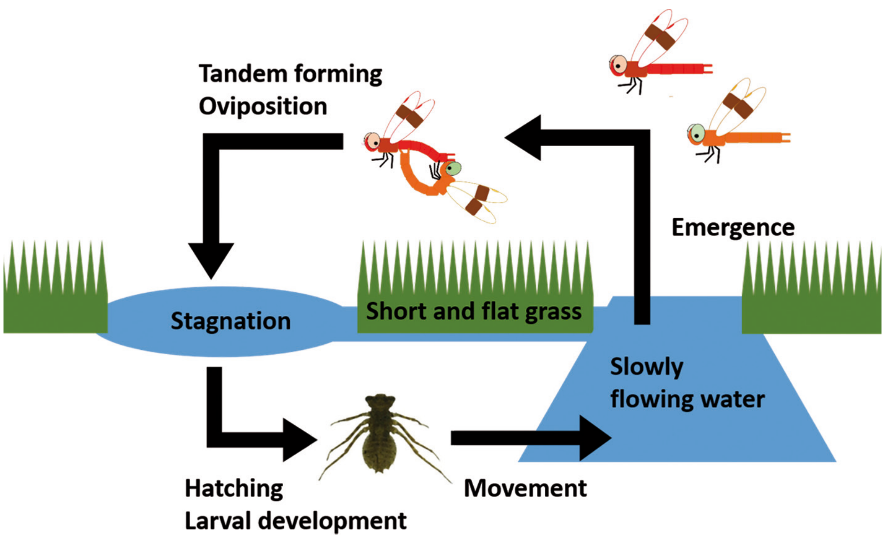

Figure 7. Microhabitat use of *Sympetrum pedemontanum elatum* during its entire life history in Hyogo Prefecture, Japan.

Table 2. Coefficients for the best and second-best models explaining variation in the number of abdominal dips by *Sympetrum pedemontanum elatum* at different oviposition sites in Hyogo Prefecture, Japan.

Model	Best				Second-best			
Term	Coefficient	SE	*t*	*p*	Coefficient	SE	*t*	*p*
Constant	3.910	0.204	19.169	<0.001	4.032	0.225	17.928	<0.001
S	0	–	–	–	0	–	–	–
F	-1.543	0.130	-11.914	<0.001	-1.386	0.146	-9.482	<0.001
G	-0.009	0.002	-4.78	<0.001	-0.008	0.002	-3.634	0.002
D	–	–	–	–	-0.056	0.026	-2.149	0.044

Dragonflies use water surface reflection as a visual cue related to reproductive behaviors (*e.g.*, Wildermuth 1998; Takahashi & Watanabe 2009, 2010; Watanabe 2015: 52 f); thus, *S. p. elatum* females may be able to visually select optimal water conditions for oviposition. Indeed, females did not perform oviposition behaviors over strongly flowing (greater than 16 cm/s) or deep (greater than 21 cm) water (Annex 2, 3). Rather, they performed abdominal dips more frequently into stagnant water, which was enhanced by its shallow depth, indicating that the dragonflies may have also recognized water condition with their sense of touch (Corbet 1999: 17). For example, *Leucorrhinia intacta* senses warmer temperatures (approximately 28°C) of stagnant water by dipping abdomen in their oviposition, which can increase hatching rate of eggs (Wolf & Waltz 1988).

The larvae of most *Sympetrum* species in Japan inhabit pools or ponds, except for those of *S. p. elatum* (Ishida et al. 1988: 113 ff; Ozono et al. 2013: 373 ff), which has been typically described as a lotic species (Ishida et al. 1988: 113; Aoki 1998: 88; Kondo et al. 2005: 78; Inoue & Tani 2010: 56; Muraki 2010; Ozono et al. 2013: 404). However, young larvae of *S. p. elatum* are often observed in shallow, stagnant water connected to flowing water in the spring (Ishida et al. 1988: 113; Aoki 1998; Kondo et al. 2005: 78; Inoue & Tani 2010: 56; Ozono et al. 2013: 404; Kawachino 2015) (Fig. 7), and it is likely that they need a continuum of water conditions from stagnant to slowly flowing water to develop (Higashikawa et al. 2016). Our study explains the process by which young larvae of *S. p. elatum* are likely distributed in shallow stagnant water.

In traditional rice paddy fields, which were the main habitats of *S. p. elatum* before the 1970s in Japan (Ishida et al. 1988: 113; Ozono et al. 2013: 404; Kawachino 2015; Higashikawa et al. 2016, 2017), tandem pairs entered into rice tussocks to oviposit in stagnant water near the stems (Taguchi & Watanabe 1985). Since water management in paddy fields was modernized in the 1970s, which obstructed the movement of *S. p. elatum* larvae between stagnant paddies and slowly flowing irrigation ditches (Fujioka & Lane 1997; Higashikawa et al. 2016), these dragonflies have gradually decreased in the rural areas.

The Sakasegawa River, which was made flat and slowly flowing during soil-erosion control works in the 1900s (Hyogo Prefectural Government 2009), fortunately has provided water conditions suitable for larval inhabitation (Higashikawa et al. 2016) and adult oviposition, which have been lost in paddy fields. In addition, short and flat grass maintained by regular grass trimming in this river provides suitable adult habitats for tandem formation (Higashikawa et al. 2017) and also for oviposition as shown in this study. Even now, however, overgrowth of riparian grasses has been accelerated by eutrophication of inland water on a worldwide scale and is reducing the availability of early successional stage grass-dominant dragonfly habitats (Corbet 1999: 568). Not only for *S. p. elatum* conservation but also for that of other endangered aquatic organisms, riparian grass management should be considered on a countrywide scale in Japan.

In conclusion, the specific combination of short grass and a continuum from stagnant to slowly flowing water, which cannot be sustained without proper riparian management, can provide not only larval and adult habitats (Higashikawa et al. 2016, 2017) but also suitable oviposition sites for *S. p. elatum* (Fig. 7). For the conservation of this attractive darter, which is intertwined with human activity in Japan, we need to properly manage its habitat both in suburban rivers as well as in rural paddy fields.

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Annex 1. Perching height of (a) male and (b) female *Sympetrum pedemontanum elatum* before tandem formation in Hyogo Prefecture, Japan.

(a) Date 2017	Plot	Perching height of males [cm]	(b) Date 2017	Plot	Perching height of females [cm]
15-ix	2	36	18-ix	1	124
15-ix	2	53	18-ix	1	50
15-ix	2	122	18-ix	1	95
15-ix	2	61	18-ix	1	54
15-ix	2	65	18-ix	1	82
15-ix	2	54	18-ix	1	95
15-ix	2	50	18-ix	1	46
15-ix	2	76	18-ix	1	47
15-ix	2	60	18-ix	1	44

(a) Date 2017	Plot	Perching height of males [cm]	(b) Date 2017	Plot	Perching height of females [cm]
15-ix	2	45	18-ix	1	60
15-ix	2	18	18-ix	1	84
15-ix	2	15	18-ix	1	59
15-ix	2	12	18-ix	1	62
15-ix	2	13	18-ix	1	58
15-ix	2	12	18-ix	1	89
15-ix	2	8	18-ix	1	6
15-ix	2	15	18-ix	1	21
15-ix	2	17	18-ix	1	38
15-ix	2	16	18-ix	1	18
15-ix	2	25	18-ix	1	9
18-ix	1	111	18-ix	1	16
18-ix	1	67	18-ix	1	7
18-ix	1	46	18-ix	1	4
18-ix	1	42	18-ix	1	7
18-ix	1	70	18-ix	1	12
18-ix	1	55	18-ix	1	13
18-ix	1	38	18-ix	1	21
18-ix	1	68	18-ix	1	14
18-ix	1	73	18-ix	1	32
18-ix	1	120	18-ix	1	26
18-ix	1	14	18-ix	2	33
18-ix	1	27	18-ix	2	24
18-ix	1	9	18-ix	2	36
18-ix	1	14	18-ix	2	17
18-ix	1	11	18-ix	2	10
18-ix	1	10	18-ix	2	61
18-ix	1	10	18-ix	2	100
18-ix	1	13	18-ix	2	36
18-ix	1	5	18-ix	2	85
18-ix	1	11	18-ix	2	72
	Mean	39.68		Mean	44.18
	SD	31.43		SD	31.29

Annex 2. Observation data of *Sympetrum pedemontanum elatum* adults from tandem formation to oviposition in Hyogo Prefecture, Japan. Missing data was due to one of the following reasons: (i) we switched our observation from the target pair to another pair starting copulation; (ii) some tandem pairs were visibly lost during observation; (iii) some tandem pairs were observed from the middle of mating process.

			Tandem formation			Oviposition							
						Grass height around oviposition spot [cm] Measurement order:							
Date 2017	Plot	Pair No.	Perching height [cm]	Distance from water [m]	Copulation duration [s]	1	2	3	4	5	Water flow (S or F)	Water depth [cm]	Number of dips
09-ix	1	1	13	4.2									
09-ix	1	2	32	0.8									
09-ix	1	3	28	4.5									
09-ix	1	4	14	2.2									
09-ix	1	5	38	0									
09-ix	1	6	45	0									
09-ix	1	7	43	1.7	217								
09-ix	1	8	38	0.3	242						S	3	4
09-ix	1	9	17	2.4	222						F	6	2
09-ix	1	10	31	0		34	31	26	37	42	S	1	2
09-ix	1	11	32	0.1	259	32	34	46	18	29	S	1	4
09-ix	1	12	33	0.1	200	37	52	38	41	31	F	6	1
09-ix	1	13	37	0	267	30	33	49	17	29	S	2	117
09-ix	1	14									S	7	6
09-ix	1	15	34	0.2	191	46	32	18	29	33	F	7	4
09-ix	1	16	38	0.3	202								
13-ix	2	17				72	50	33	52	37	F	12	5
13-ix	2	18				81	70	32	83	92	S	2	17
13-ix	2	19	62	0	354	49	39	35	49	70	S	1.5	16
13-ix	2	20									S	4	106
13-ix	2	21	36	0.4	200								
13-ix	2	22	68	0	203	32	41	19	12	35	S	20	6
13-ix	2	23	62	0	270	15	35	20	39	10	S	20	4
13-ix	2	24	54	0	234	68	51	37	74	70	S	2	36

			Tandem formation			Oviposition							
						Grass height around oviposition spot [cm] Measurement order:							
Date 2017	Plot	Pair No.	Perching height [cm]	Distance from water [m]	Copulation duration [s]	1	2	3	4	5	Water flow (S or F)	Water depth [cm]	Number of dips
13-ix	2	25	49	0	161								
13-ix	2	26	28	0	184	84	88	74	63	63	F	12	4
13-ix	2	27				48	50	67	54	57	F	20	6
13-ix	2	28				44	41	38	29	22	S	7	7
13-ix	2	29	36	0							S	3	33
14-ix	1	30	12	1.7	158								
14-ix	1	31	38	0.5		48	39	48	51	61	F	7	4
14-ix	1	32	33	0									
14-ix	1	33	35	0									
14-ix	1	34											
14-ix	1	35				53	62	45	41	47	F	3	1
14-ix	1	36	52	0	635								
14-ix	1	37				92	74	68	77	81	S	4	24
14-ix	1	38									F	5	14
14-ix	1	39	60	0	237						F	21	7
15-ix	2	40	4	0.5									
15-ix	2	41	52	0	244								
15-ix	2	42			288	103	100	97	74	90	S	1.5	24
15-ix	2	43				72	101	87	105	98	F	4	3
15-ix	2	44				84	99	106	103	72	F	5	8
15-ix	2	45				28	32	17	17	21	S	3	42
18-ix	1	46	76	0.2		18	9	11	19	10	F	3.5	29
18-ix	1	47	17	0.4	568								
18-ix	1	48				27	19	30	22	25	S	4	88
18-ix	1	49				105	97	101	95	89	F	10	4
18-ix	1	50				55	50	56	42	60	S	7	37
18-ix	1	51				92	87	99	101	107	F	10	12
18-ix	1	52				30	26	24	21	23	S	4	52
Mean			37.79	0.62	263.62			51.93				6.72	21.44
SD			16.64	1.15	118.45			25.81				5.71	29.00

Annex 3. Water flowing velocity at the oviposition spots of *Sympetrum pedemontanum elatum* tandem pairs in Hyogo Prefecture, Japan.

Date 2017	Plot	Oviposition spot No.	S or F	Water flowing velocity [cm/s] Measurement order:				
				1	2	3	4	5
22-ix	1	1	S	0.6	0.7	0.6	0.6	0.6
22-ix	1	2	S	0.7	0.7	0.7	0.7	0.7
22-ix	1	3	F	12	13	12	12	13
22-ix	1	4	F	6.0	6.0	7.0	8.0	8.0
22-ix	1	5	F	7.0	8.0	8.0	9.0	8.0
22-ix	1	6	S	0.7	0.7	0.6	0.7	0.7
22-ix	1	7	F	14	16	16	15	16
22-ix	1	8	F	6.0	5.0	5.0	5.0	5.0
22-ix	1	9	F	10	10	10	11	10
22-ix	1	10	F	7.5	7.5	7.0	7.5	7.5
08-x	2	11	S	1.1	1.2	1.1	1.1	1.2
08-x	2	12	F	3.5	3.7	2.2	2.1	3.9
08-x	2	13	S	0	0	0	0	0
08-x	2	14	S	0	0	0	0	0
08-x	2	15	S	1.2	2.4	2.5	0	1.2
08-x	2	16	S	1.0	0.5	0.7	0.9	0.8
08-x	2	17	S	0	0	0	0	0
08-x	2	18	F	6.1	6.0	5.9	4.8	6.2
08-x	2	19	F	5.4	5.4	6.4	5.6	5.4
08-x	2	20	F	9.6	10.4	9.8	8.2	8.4
			Mean			4.74		
			SD			4.51		