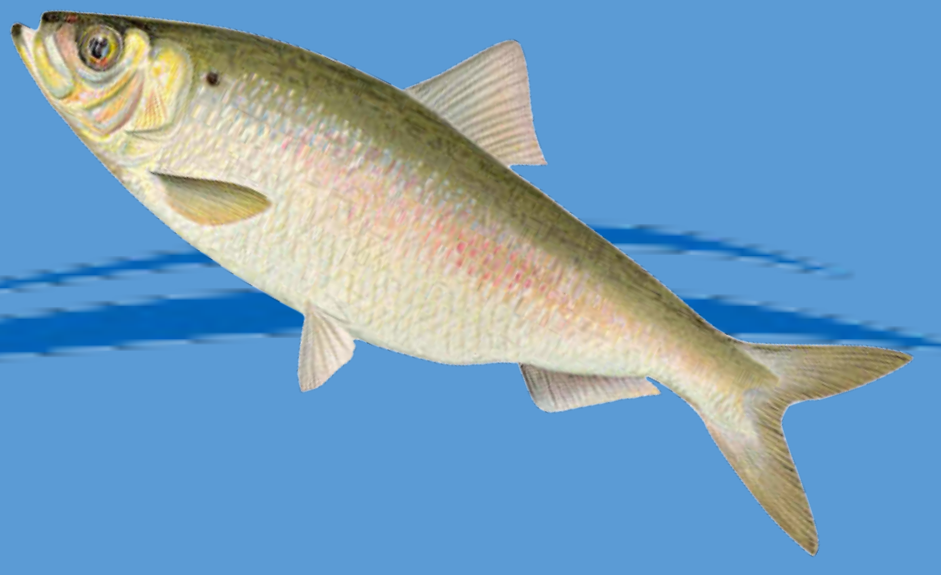


Expert Swimmers and Tank Potatoes: Swimming Behavior of Alewives (*Alosa pseudoharengus*) at Differing Migratory Stages

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INTRODUCTION

Alewives (*Alosa pseudoharengus*) are a threatened and diadromous species, acting as biological connections between our freshwater and marine systems during migration. Swimming performance is a critical factor for survival in both lotic and marine environments, influencing predator evasion, prey capture, and successful migration.

While preliminary data show that swimming capacity and body size are greater in actively-migrating (migrant) alewives than those not yet migrating (resident), it is still unknown if swimming behavior differs between these groups. To investigate this, I conducted a behavioral analysis on migrant and resident juvenile alewives.

? Does swimming behavior differ between migrant and resident juvenile alewives?

HYPOTHESES

Migrants (actively-migrating) vs. Residents (not yet migrating)

Expected frequency of long-term behaviors: $M > R$
 Expected occurrence of active behaviors: $M > R$

METHODS

Field Collection: Residents were purse-seined from Bride Lake, and migrants were weir trapped from Bride Brook in East Lyme, CT. Body length and mass were measured for each individual.

Video Footage: 30 fish per group were swum, one at a time, at one body-length per second for one hour in a Loligo swim tunnel and video recorded.

Data Collection: 20 ten-minute-segments of video were randomly chosen for each group. Behaviors and time budgets were recorded using Behavioral Observation Research Interactive Software (BORIS)¹.

Ethogram			
Behavior	Description	Type	Category
Bang Head	Frantically swim into the wall of the tunnel, head first	State	Active
Dashing	Swimming rapidly from front to back of the tank		Active
Moseying	Swimming slowly in the center of the tank		Passive
Laying	Briefly lay on side in the middle of the tank	Point	Passive
Resting	Not actively swimming, no tail flicks for 2-5 seconds		Passive
Zig Zag	Quickly move from side to side of the tank		Active

TABLE 1 – Six solitary swimming behaviors were observed and described in an Ethogram. State behaviors are those exhibited for extended periods of time, and point behaviors are those exhibited for a very short period of time or in one moment. Behaviors were further categorized into “active” (high energy) and “passive” (low energy with limited to no tail flicks).

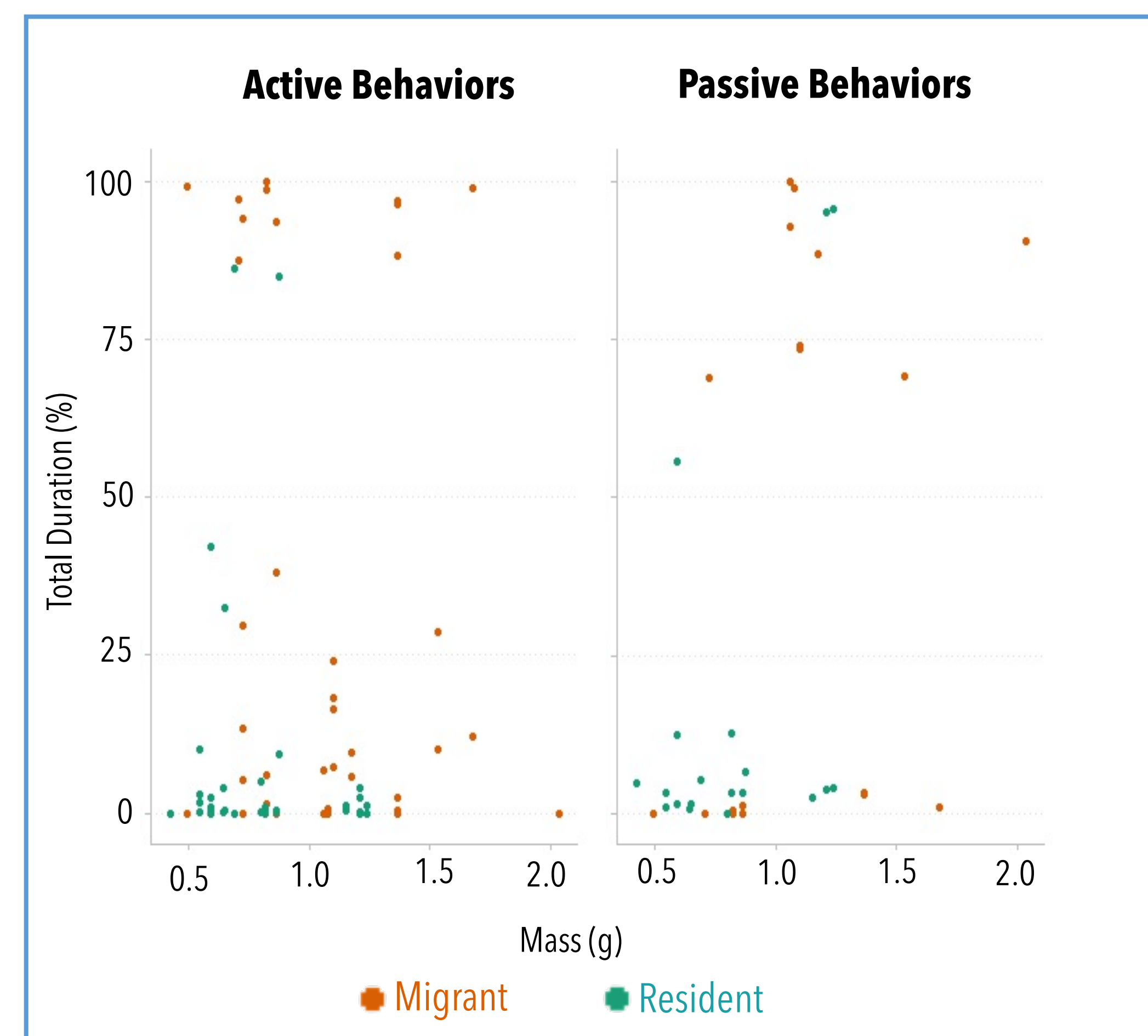


FIGURE 1 – There was a significant correlation between body mass and percent total duration for passive behaviors ($p = 0.0489$), but not for active behaviors ($p = 0.139$).

METHODS (cont.)

Ethogram: Behaviors were named, described, and categorized in an Ethogram (see Table 1).

Data analysis: Generalized linear models were used to analyze effects of mass on behaviors, and t-tests were used to analyze group differences in point and state behaviors.

RESULTS

Size: There is significant correlation between mass and passive behaviors (Figure 1).

Migrant vs. Resident: Migrants had significantly greater percent total duration of both active and passive behaviors (Figure 2). No differences were found in number of occurrences of active and passive behaviors between groups.

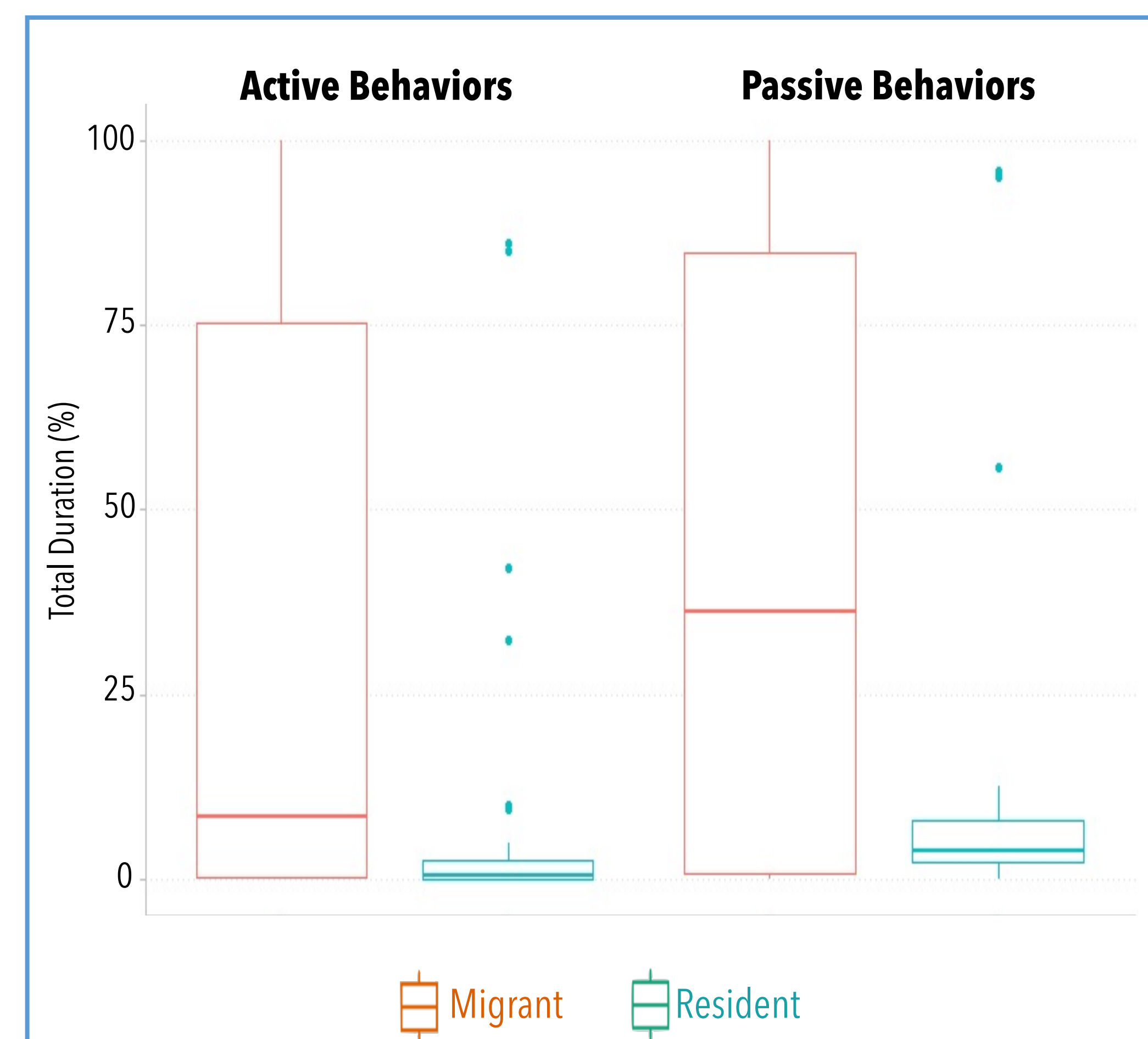


FIGURE 2 – Migrants had significantly greater percent total duration than residents for active ($p = 0.0007$) and passive ($p = 0.0186$) behaviors.

DISCUSSION & CONCLUSION

Migrant and resident juvenile Alewife show a significant difference in duration of solitary swimming behavior. The significantly greater percent total duration in migrants indicates that they were able to maintain a behavior for a longer percentage of the sampling period. This may be due to greater metabolic capacity. Because there was no significant difference in number of occurrences of behaviors between groups, migratory group variation is not present in point behaviors. Both groups were equally likely to exhibit the same behaviors, but migrants are able to exhibit those behaviors for a greater duration.

Preliminarily, there is a significant relationship between mass and passive behavior duration, but a small sample size makes this correlation unreliable. Future studies should observe Alewife behavior in a natural environment, since size more likely influences predator-prey behavior.

TAKE-HOME

Migrant alewives may be able to maintain behaviors for longer durations but are no more likely to exhibit active behaviors than residents.

Migrants vs. Residents

Frequency of long-term behaviors: $M > R$
 Occurrence of active behaviors: $M \approx R$

REFERENCES

1. Olivier Friard and Marco Gamba. (2016) BORIS: a free, versatile open-source event-logging software for video/audio coding and live observations. *Methods in Ecology and Evolution*, 7(11), 1324-1330

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