sDiv working group meeting report
"sPriority"

During the third sPriority meeting held at iDiv on 9-13 October 2023, we worked on two main objectives:

1) Conducting a quantitative analysis (meta-analysis) on the strength and direction of priority effects across organisms and ecosystems using data from experiments that explicitly manipulated the order of arrival of species (meta-analysis group).

2) Investigating the importance of historical contingency and priority effects in structuring plant biodiversity using data from the Global Restore project (GRP) spearheaded by Emma Ladouceur and Jonathan Chase (GRP group).

We started the meeting with a general discussion about the progress made for the different projects since our last meeting in September 2022. A few weeks before the start of our third meeting, James Stroud (Georgia Institute of Technology, USA) submitted the first paper coming out of our working group to *Trends in Ecology and Evolution*. As of 13 November 2023, this manuscript is still under review with *TREE*. Before the meeting, the meta-analysis group had mainly worked on data extraction from selected papers and made a lot of progress in building a database from which effect sizes can be calculated. At the beginning of our third meeting, the sPriority database contained around 16,000 rows of extracted data. We had also made significant progress in writing the R code needed to calculate effect sizes and quantify priority effects for a wide range of order of arrival scenarios. Also, on the first day of the meeting, Chelsea Little (Simon Fraser University, Canada), the leader of the meta-analysis group, showed preliminary results that were already presented at the last annual meeting of the Ecological Society of America in August 2023. The GRP group led by Emma Ladouceur (iDiv) also made significant progress by carefully selecting datasets to include in our study. On day 1 of the meeting, Emma shared some preliminary analyses with the group. All this work laid a solid foundation for our third meeting.

Each day of the rest of the week was organized as follows. We started the day with a group discussion about open questions and key objectives of the day. The group then usually split into two groups, one for each project. Some members, particularly the PIs of the working group, moved between the groups as needed. At the end of each day, we reconvened with the whole group to discuss existing challenges and decide on the next steps. Most members participated in person, but a few sPriority members in North America did participate remotely via Zoom. All group discussions and seminars (e.g., introduction to Bayesian statistics using the BRMS R package by Emma Ladouceur) were recorded via Zoom. This allowed other group members in very different time zones to catch up, and also enabled us to keep a detailed record of our discussions (in addition to the notes taken in a Google document).

Overall, the working atmosphere was really excellent and we made much progress during this third in-person meeting. Members of the meta-analysis group mainly focused on the following tasks: (1) checking that data added to our database has been encoded without mistakes (this involved manual checks as well as writing R code to check that specific criteria are met for each row of data), (2) writing R code to quantify priority effects and calculate

effect sizes, (3) collect additional data on important moderators for our meta-analysis (e.g., whether intraguild predation existed in each experimental study from which data were extracted, body size, etc.), (4) run preliminary analyses and present the results to the all group, (5) developing conceptual figures for upcoming manuscripts, and (6) start writing the introduction and method section of the paper presenting the first results of our meta-analysis. The GRP group focused their work on the following tasks: (1) building on the preliminary analyses already performed to finalize the questions concerning priority effects that can be asked with the GRP dataset, (2) drawing drafts of the conceptual figures that depict these questions, and (3) clarifying the limitations and strengths of the analyses.

We took the opportunity of this third meeting to carefully plan the first papers that will come out of our working group. In particular, we discussed the content of four papers:

- A data paper presenting the sPriority database developed by the meta-analysis group. We aim to submit this paper to *Ecology* in 2024.
- A method paper describing our framework to quantify priority effects and comparing different priority effect metrics and reference scenarios commonly used in the scientific literature to quantify priority effects. We expect to submit this paper to *Methods in Ecology and Evolution* in 2024.
- A paper presenting the results of our first meta-analysis (objective 1). This paper will focus on the strength and direction of priority effects across organisms and ecosystems. The R package developed by our working group to calculate effect sizes and quantify priority effects will be described and made available with this paper. Building the database needed for this project took longer than expected and we expect to submit our manuscript to the synthesis section of *Ecology Letters* in 2024.
- A paper presenting the results of the GRP project. This paper will focus on the relationship between management interventions, plant biodiversity and priority effects in restoration. We aim to submit the manuscript presenting the results of these analyses in 2024.

In the next months, several members of the working group will try to organize one or two writing retreats to finalize these manuscripts.

During this last meeting, our working group also shared new ideas for follow-up projects and discussed funding options for future work.

The logistical support from the iDiv staff was very helpful, and we cannot think of any feedback to give for improvement. Thank you very much for supporting our working group!