We appreciate the thorough review and thoughtful comments from the two reviewers and science editor. In accordance with their recommendations, we’ve made many small changes to the manuscript, which are reflected in our responses below (in blue text). The largest change is moving much of the body with code chunks into individual boxes. We now include five boxes that break up the general workflow that was originally in the main text. We believe these changes have significantly improved the manuscript and thank the reviewers and editor for their responses.

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Reviewer: 1  
  
Comments to the Author  
line 20-21, consider using "software package" instead of "software ecosystem"

While we understand the reviewer’s comment, we choose not to use “package” because the word is generally used to describe standalone R packages (not including Shiny apps). Because of the inclusion of the Shiny app, which is not packaged with the R package on CRAN we use the word “ecosystem”. Software ecosystems have been described as “a collection of software projects, which are developed and co-evolve in the same environment”, which we believe is appropriately termed for hatchR.

line 42, you define "accumulated thermal units" above in line 37 and then you don't use the acronym here. Please use ATU's

See response to reviewer 2  
  
line 89 you use the vernacular "vignettes" which is appropriate for R users, but may not be understood well by non-users, define the term.

Changed to “Articles” to match website terminology.  
  
line 153-154, it would be great if the package could be developed to automatically handle missing data. Just a comment for future development. Thank you for lines 169-171!

Great suggestion, we will look into it for the future!

lines 357-359, what would be the cut-off between a "good fit" and a "poor fit"? <0.80?

We don’t recommend standards for a “good” or “poor” fits because ultimately, they are subjectively left to the user. These fits are about how much error users are willing to introduce into their estimates for phenology from just their model parameterization, which will have a variable threshold among users. Anecdotally, we haven’t seen fits <.9 for models with sufficient data for fitting a model.  
  
Very nice usage of Case Studies! Good job!

Appreciate the comment.  
  
lines 504-517, very good! Could also be utilized to determine if broodstock are re-introduced to a habitat that is favorable or not for spawning and development based on hatchR output.

Absolutely, we envision many such case uses!  
  
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Reviewer: 2  
  
Comments to the Author  
This manuscript contains a description of a freely available R Package that estimates hatching and emergence timing for poikilothermic aquatic organisms in the natural environment. Additionally, it provides two illustrative case studies that demonstrate the potential usefulness of the package for researchers, conservationists, and land use or fisheries managers. The manuscript is well written and clearly walks the reader through the major functions of the package and outlines the data needed, as well as important QA/QC considerations. While it is not a typical fisheries manuscript, it does provide “new ideas and approaches”, which makes it suitable for consideration for inclusion in Fisheries. As I said above, the manuscript is well written and I have only a few minor suggestions to expand the potential audience and improve overall readability.  
  
Line 13: Consider how to incorporate hatchR’s potential usefulness for taxa other than fish in the Abstract to catch the eye of non-fish-folk. The first sentence might be altered to: “Understanding the timing of key life history events is essential for effective conservation and management of fish and other aquatic taxa.” (See comment for Line 24).

We appreciate the comment and agree. So much so that we have another paper in review about using hatchR for non-fish organisms.

Line 22: Replace “stream” with “daily water”, since hatchR would be useful in lentic applications as well.

Changed.

Line 24: If you incorporate the suggestion for Line 13, you could end the sentence on this line with, “…parameterizations using external datasets for other fish species or aquatic taxa.”

See response to Line 13 suggestion.

Line 37: ATU is never used again in the manuscript. Is the acronym necessary?

Changed to: (i.e., ATU models). While we do not use it again, we include it is as it is the common vernacular for these models.

Line 65: …to unparameterized taxa, species, or populations.

See comment about additional manuscript.

Line 68: Provide a link to the package (like you did for the Shiny app).

The link is to the project website which contains information about the R package and Shiny app. Further clarified such in the mentioned sentence.

Line 72: The link to the Shiny app would be more helpful here where the app is introduced and described (along with the citation), rather than down in the case study.

Changed.

Lines 81-83: The first thing I thought when I read this was that figures showing data plots might be helpful. Especially if they demonstrate a common error in the data. You might indicate to the reader here that additional information is provided below (e.g., Line 153 and Fig. 3).

Now references the Box for Data checks.

Line 123: It would be nice to expand the X-axes in both panels to 15 or 16, to provide a value beyond the right-most data points.

Changed for limits to extend to 15.

Line 145: If the temperature measurement is a daily average, what usefulness would the optional time data provide?

This is in direct reference to data from field loggers which include time stamps because they take multiple daily measurement. Clarified as such inline.

Lines 149 and 151: I’m not sure of the usefulness of Table 1. This seems like a sufficiently straightforward concept. A more useful table, for the reader, might be one identifying the species hatchR has established parameterizations for and possibly the source (Lines 131-134).

We agree about Table 1, and decided to remove it altogether. With respect to model table, this is easily accessible from the package and it is not necessarily core to it (and worry readers may see the package as salmonid-centric). For simplicity therefore, we have not added this in.

Line 298: By default,…

Fixed.

Line 311: I’m not sure species-agnostic is quite right. I doubt the model is uncertain or unconvinced of the species.

Consider the following: …fit\_model () function, which only requires that a species’ development follows a power law…

Changed to reflect suggestion.

Lines 340-341: Why not just present the smb data as days and C⁰? This would eliminate the need for the coding on Lines 343-348, which R coders should be able to do and would make the interpretation of Figure 5 more straightforward.

Moving to Box—Custom model parameterization. We choose to keep it in because it shows how data taken from literature might need to be adapted to work properly for hatchR framework.

Line 363: I am not sure what the significance of the 16⁰ C mean temperature is. Is this just an attempt at a reasonable representation of a “normal or typical” temperature profile when these three species spawn? If I’m interpreting Figure 5 right, it looks like for fish that spawn on July 1 at 14.0⁰ C sturgeon hatch in 4-d at an average incubation temperature of about 14.5⁰ C, smallmouth hatch in 8-d at an average temperature of about 15⁰ C, and catfish hatch in 19-d at an average temperature of about 15.5⁰ C. Perhaps I’m overthinking this.

We did this to highlight how different species develop at different rates under identical thermal conditions. We have revised the new Box 4 text to make this explicit:

“Next, to emulate a wild environment, we simulated a thermal regime featuring an ascending thermograph with a mean temperature of 16 °C and standard deviation 1 °C (available in paper.Rmd, chosen to represent a reasonable putative temperature regime). To highlight how different species develop at different rates under identical thermal conditions, we apply the custom models for each species using predict\_phenology() (only Smallmouth Bass shown below)…”

Line 366: Bass (not base).

Fixed.

Line 390: Should identify Idaho, USA in this sentence somewhere.

Fixed.

Line 390: Latin binomial for Bull Trout already introduced (Line 53).

Fixed.

Line 398: I recommend moving the link up to Line 72 (see associated comment there).

Moved to match suggestion.

Line 419: This sentence is the crux of the matter! Consider moving it up to the end of the first paragraph on Line 388, instead of burying it at the end of the section.

Moved to match suggestion.

Line 427: It might be more accurate to say 226 locations in northern Idaho. The headwaters of the Columbia River are in British Columbia.

While the Snake River is the upper Columbia River watershed, we’ve changed to “greater Snake River watershed” to be more precise.

Line 432: Is this mean daily temperature in August or monthly August temperature? Does it matter?

Monthly August temperature, which is highlighted in Isaak et al. 2015 citation.

Line 555: Other places you capitalize Shiny here you do not.

Good catch, thanks!  
  
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Editor's Comments to Author:  
  
Science Editor  
Comments to the Author:  
This is a well written manuscript that should interest many Fisheries magazine readers.  I strongly suggest you consider moving some of the software operation detail into boxes.  The boxed material can then be referred to in the main text by (See Box #) or similar language.  Keep in mind, while applicable to those considering the use of hatchR right now, this level of detail bogs down most general readers who might use it in the future or suggest its use to colleagues not receiving the magazine.  Bogged down readers usually become disinterested readers that do not finish reading the article.  
  
There are several items that do not conform to AFS’s “A Guide to AFS Publication Style (2016)”.  This style guide can be found on the AFS website under publication.  Please review this guide and ensure your revision conforms to the guidelines.  According to this guide the first letter of salmonids is not capitalized unless it is the first word in a sentence (2.15), common names of groups of related species, like Pacific salmon, are not capitalized (9.7), and when there are more than two authors text citations should only include only the last name of the first author followed by “et al.” (8.1).  Common species and place names in reference titles, like “Coho Salmon” and “Copper River Delta, Alaska.” in the Adelfio et al. reference are capitalized.  Unless something has changed with the move from Wiley to Oxford Press figures and tables should not be inserted within the text.  
  
I suggest you substitute “The hatchR software” for “hatchR” in any sentence starting with hatchR to clarify a new sentence is starting.  
  
The manuscript received favorable rating from both reviewers with some suggestions for improving the manuscript.  Please carefully consider these suggestions and utilize them as you believe appropriate to make a good manuscript even better.  
  
Some specifics on my suggested material to be placed in boxes and nonconformance with the style guide follow below.

Line 172 to 231:  Move this material into Box 1.

Changed.

Line 242 to 271:  Move this material into Box 2.

Changed.

Line 276-293:  Move this material into Box 3.

Changed.

Line 336 to 382:  Move this material into Box 4.

Changed.

Line 397 to 415:  Move this material into Box 5.

We think the two case studies are more appropriate in manuscript and worry too much of the body may end up in boxes and read overly light as a result.

Line 435 to 458:  Move this material into Box 6.

See previous comment.

Line 49:  salmonids should not be capitalized.

Changed.

Line 51: salmon should not be capitalized.

Changed.

Line 56: salmonids should not be capitalized.

Changed.

Line 58: salmonids should not be capitalized.

Changed.

Line 63: Sparks, Westley, Falke, & Quinn (2017) should be replaced with Sparks et al. (2017).

Changed.

Line 137: salmonids should not be capitalized.

Changed.

Line 145:  Start sentence with “The hatchR software” not hatchR.

Changed.

Line 152:  Start sentence with “The hatchR software” not hatchR.

Changed.

Line 165:  Start sentence with “The hatchR software” not hatchR.

Changed.

Line 167:  Start sentence with “The hatchR software” not hatchR.

Changed.

Line 274-275:  If use suggested boxes than replace “Each…..” with “As illustrated in Box 3 each component provides different insight into the predicted phenology.”.

Moved all to Box.

Line 295: Start sentence with “The hatchR software” not hatchR.

Changed.

Line 298:  Replace “Be default”, with “The default function” or “By default” .

Changed.

Figure 4:  Consider using a legend using dot-dash type lines as well as colors to facilitate color blind individuals ability to distinguish between the lines.

The chosen colors are colorblind friendly. If you run the following code in your R console it will demonstrate as such:

install.packages("prismatic")

#below are hex codes for colors in plot

prismatic::check\_color\_blindness(c("#0072B2", "#E69F00", "#009E73"))

Line 326:  The salmonids in “non-Salmonids” should not be capitalized.

Changed.

Line 334:  If use suggested boxes replace “below” with “in Box 4”.

Added to Box.

Line 391-392:  Nolfi, Mebihess, Fisher, & Ellis, 2024” with “Nolfi et al. 2024.

Changed.

Line 396:  If material beginning on line 397 is moved to a box then on line 396 following “September 30th.” Insert “This case study is demonstrated in Box 5 using the hatchR graphical user interface.”

See comment about case studies above

Line 397:  If material beginning on line 397 is moved to a box then replace “To demonstrate this case study,”  with “Case study 1 is demonstrated with the hatchR graphical user interface available at….”.

See comment about case studies above

Line 428:  Replace “Isaak, Luce, Chandler, Horan & Wollrab (2018)” with “Isaak et al. (2018)”.

Changed.

Line 431: Replace “Isaak, Young, Nagel, Horan, & Groce (2015),” with” Isaak et al (2015)”.

Changed.

Line 434:  After “potential spawning sites.” Add “The analytical steps are illustrated in Box 6.”

Opted to keep case studies in main body. See above.

Line 514: Replace (Conover, Duggy, & Hice 2009, Sparks, Kraft, Blackstone, McNIckle, & Christie, 2022) with (Conover et al. 2009, Kraft et al. 2022).

Changed.

Line 538: Replace “hatchR” with (The hatchR sofltware”

Changed.

Line 574: Replace “coho salmon” with “Coho Salmon”.

Changed.

Line 575: Replace “copper river delta, alaska” with Copper River Delta, Alaska”.

Changed.

Line 582: Replace “chinook salmon” with “Chinook Salmon”.

Changed.

Line 585: Replace “bull trout” with Bull Trout”.

Changed.

Line 602: Replace “chum salmon” with “Chum Salmon”.

Changed.

Line 615: Replace “coho salmon” with “Coho Salmon”

Changed.

Line 618: Replace “dolly varden” with “Dolly Varden”.

Changed.

Line 622: Replace “bull trout” with “Bull Trout”.

Changed.

Line 628-629: Replace “channel catfish” with “Channel Catfish”.

Changed.

Line 631: Replace “lake sturgeon” with “Lake Sturgeon”.

Changed.

Line 636: Replace “sockeye salmon” with Sockeye Salmon”

Changed.

Line 645: Replace “sockeye salmon” with Sockeye Salmon”.

Changed.

Line 647: Replace “sockeye salmon” with “Sockeye Salmon”.

Changed.

Line 651: Replace “smallmouth bass” with “Smallmouth Bass”.

Changed.