

Coding Manual for Adolescent-Nature Interactions at a Youth Group Home

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Abstract

This technical report provides our coding manual – our systematic method to code qualitative photovoice data – from a study of nature interactions supporting coping and resilience among adolescents with histories of trauma living in a youth group home. Other authors on this study (but not on this coding manual) include Jean Kayira (SUNY College of Environmental Science and Forestry) and Elizabeth McCann (Department of Environmental Studies, Antioch University, New England). Using the interaction pattern method detailed in this coding manual, we coded interview data from 12 adolescents about their meaningful nature interactions. A total of 1212 (Level 1) IPs were coded in these data from the participant’s interviews and categorized into 61 Level 3 IPs such as *viewing nature from a different vantage point, moving along the edges of nature, foraging or harvesting edibles to eat or drink, experiencing periodicity of nature, or experiencing nature with others.*

This study introduced an Interaction Pattern Approach (IPA) as a means to explore how meaningful nature engagement fosters coping and resilience in adolescents with histories of trauma. This methodology centers on Human-Nature Interaction Patterns (IPs) and applies a consensus coding process to discern the links between IPs and understandings of resilience. This study resulted in seven themes labeled, “Coping and Resilience Domains” which are supported by 37 subthemes labeled, “Strengths.”

This technical report provides open access to our core intellectual qualitative work on this project, and can be used by others seeking to employ an interaction pattern approach for studies relating to coping and resilience, or more generally seeking to characterize people’s interactions with nature. While this technical report focuses on characterizing the IPs from interview data and testing for reliability, a more detailed accounting of the consensus coding process for IPs and

coping and resilience can be found within the lead author's doctoral dissertation, "Nature Interaction Assists with Coping and Resilience: An Interaction Pattern Approach with Adolescents with Histories of Trauma in a Youth Group Home."

Introduction

Research shows that exposure to natural environments benefits mental and physical health (e.g., Bratman et al., 2019; Frumkin et al., 2017; Hartig et al., 2014), but much of this focuses on adult populations. Recent studies are exploring childhood exposure to nature, highlighting its importance for children's and adolescents' mental, social, and physical health (e.g., McEwan et al., 2022; Mygind et al., 2019). While early studies viewed nature's benefits through adult perspectives, recent work includes children's and adolescents' viewpoints on their nature experiences and well-being (e.g., Chawla, 2021; Gray et al., 2023; Keller et al., 2023).

Studies on childhood health and nature typically use surveys and experimental conditions to measure benefits. These methods, though valuable for policy and practice, may miss the nuances of adolescent nature interactions. Nature interaction, beyond mere exposure, is crucial for mental, emotional, and social health. However, literature often overlooks the myriad contexts of adolescent-nature interactions (Owens & McKinnon, 2009). More research is needed to gather diverse adolescent perspectives on their nature engagement and their impact on health and well-being. This study explores these interactions and their significance for adolescents.

While the body of literature focused on adolescent nature interactions continues to grow, it still reflects a gap in understanding specific nature interactions that foster capabilities to be holistically strong and, through development of those strengths, promote resilience. Some studies identify significant nature situations and environmental preferences (e.g., Giusti et al., 2018; Korpela et al., 2001); however, they don't fully explore the dynamics of these interactions. Anecdotal and correlational evidence linking nature experiences to well-being assist in this understanding but more research is needed to understand the underlying mechanisms (Chawla, 2014). This speaks to the need for longitudinal research to understand the depth and lasting

impact of adolescent nature experiences as they assist in developing strengths promoting coping and resilience.

This study helps to address this gap in the literature. Two primary questions guided this study:

1. How do interactions with nature support adolescents with histories of trauma and living in a youth group home in their ability to cope and be resilient?
2. How are these adolescents experiencing and relating to nature? (Answered through a consensus coding process and detailed in the first author's dissertation: Dunker, 2025)

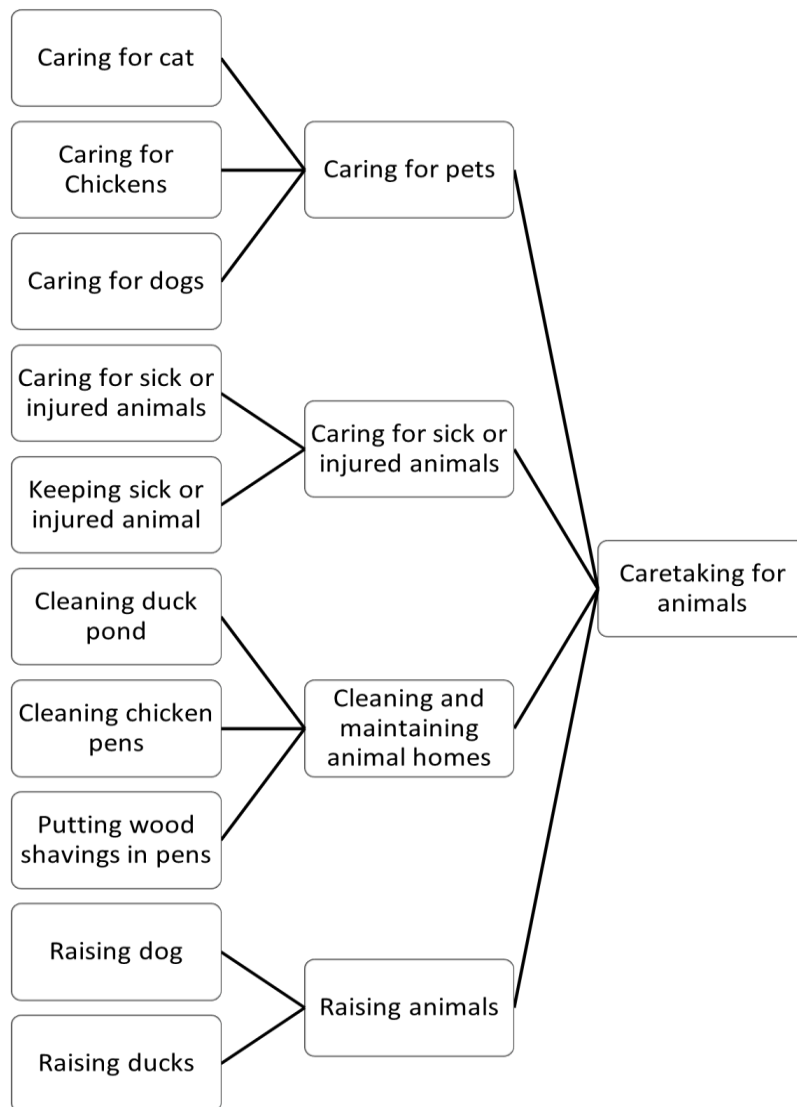
Utilizing an Interaction Pattern Approach (IPA), this study was conducted over 22 months and provides insights into the deeper reasons behind valued nature experiences that support adolescent resilience. To do this, we have employed an adolescent-nature interaction approach to examine photovoice data corroborated with researcher observations. Each participant submitted 10-15 photos from their own nature experiences representing what was important to them about their interactions with nature. These photos guided the semi-structured interviews with the lead author. The resulting narrative and observational data offer a holistic view of adolescent nature interactions specifically among those having a range of trauma histories and living in a youth group home setting.

The adolescent-nature interaction approach used in this study, and detailed in this coding manual, offers a way to characterize important adolescent-nature interactions. These physical and/or sensorial nature interactions are specified abstractly enough so as to allow for innumerable instantiations of the pattern reflecting diverse nature situations, locations, and social arrangements yet retain the core, fundamental interaction with nature (Kahn et al., 2012; Kahn, Lev, et al., 2018; Kahn & Weiss, 2017; Lev et al., 2020; Weiss et al., 2023). The following

coding manual details the Interaction Pattern Analysis coding process used to first identify adolescent-nature interaction patterns (IPs) from the narrative data, reflecting each participant's unique language and experience. These are referred to as "level 1" IPs. The manual then further details the process of abstracting the level 1 IPs to a "level 2" IP which is a more generalized form of the detailed level 1 IP. Level 2 IPs are helpful for discussing a wide array of nature interactions but are still very broad in terms of being able to meaningfully discuss them in connection with how they support adolescent coping and resilience. To facilitate such discussions, the level 2 IPs are abstracted to an even more generalized form called a "level 3" IP. It is at this level that the IPs are then discussed in terms of their importance for adolescent capabilities to be strong and resilient.

Creating a tiered structure of IPs with three levels enables us to recognize the immense diversity among individual IPs at the most specific level. It also helps us identify similarities between these IPs, which reveal relationships and enhance our understanding of the broader, more generalized forms of IPs. To illustrate this structure, consider the examples shown in Figure 1. One can easily see the diversity of IPs at the level one tier; how they become more succinctly represented at a level 2 tier; and how the level 3 tier encapsulates diverse IPs without losing their core meaning and significance.

Figure 1. *Nature Interaction Pattern Hierarchy*



Across the data, the IPs discussed by the participants were further qualified as being “linked” or “unlinked” to coping and resilience strengths. Of those that were identified as being linked, they were further qualified with a designation of an IP “type.” Types of IPs were labeled as either being intentional, incidental, indirect, or hypothetical. Detailing the IPs in this way allowed us to narrow our focus to the relevant, non-hypothetical nature interactions contributing to the development and reinforcement of personal strengths associated with resilience.

A final piece of the IP analysis process involved the identification of the nature needed. Fostering coping and resilience through nature requires environments where nature can be experienced and engaged with actively (Keniger et al., 2013). To further contextualize the IPs and their benefits for the adolescents in this study, we coded the types of nature needed for their IPs to be enacted. This was helpful to understand as their experiences were quite diverse and were enacted across a broad range of environments and forms of nature—from domestic to wilder nature.

This coding manual provides open access to our core intellectual, qualitative work applying a human-nature interaction pattern analysis to adolescent-nature interactions. It is shared publicly in the hope that others conducting related research may find it useful for their own investigations employing a human-nature interaction pattern approach. The consensus coding process to further link the level 3 IPs discerned from this analysis to the understanding of coping and resilience is provided in detail in the doctoral dissertation for which this analysis is a part (Dunker, 2025).

Definitions and Coding Rules

Interaction Patterns

An interaction pattern is a characterization of essential features of interaction between humans and nature, specified abstractly enough such that countless different embodied versions can be enacted given different types of nature, people, and purposes (Kahn et al., 2010, 2012; Kahn, Lev, et al., 2018; Kahn, Weiss, et al., 2018a, 2018b; Kahn & Weiss, 2017; Lev et al., 2020). As the simplest and most important level of coding, the interaction pattern (IP) characterizes any physical and/or sensorial (including any one or combination of five senses: touch, smell, sight, taste, sound) activity between the participant and nature. We define nature here as encompassing living organisms and ecosystems, including non-self-sustained entities (e.g., pets, livestock, house plants), and non-living natural elements (e.g., water, air, weather) that support living systems. It emphasizes direct sensory interactions with nature in various environments, from urban parks to wilderness, while excluding media-mediated interactions of nature.

We attempt to standardize each participant's unique way of talking about their human-nature interactions by coding the IP according to a format of "present progressive tense verb-(preposition)-noun" (V-(P)-N). Though the V-(P)-N is the most typical way an IP is coded, variations of this structure may be coded according to the rules outlined in this manual.

All verbs must be in reference to the participant's own action or experience (See [IP Rule 17](#)). Nouns must be a "nature noun," meaning that the coded noun must identify a feature of nature, biotic or abiotic, generally excluding any humans or human artifacts. As much as possible, use the direct language of the participant so as not to lose any of the intended meaning from their chosen language.

Coding Process

The participant narratives in this study were coded in several steps. The coding manual is written primarily to capture the first step of coding, what we call “level 1” IPs. These IPs typically contain more specific details that come directly from participants’ language and may not perfectly follow a traditional IP format (see [IP Rule 1](#)). From these level 1 IPs, more general “level 2” IPs are coded. Level 2 IPs are more generalized forms of level 1 IPs that follow a more consistent form and aim to capture various instantiations of level 1 IPs encountered throughout the study interviews. Level 2 IPs can then be further abstracted into level 3 IPs, the most general form of interaction patterns.

All narratives were first coded by a primary coder (lead author). The lead author consulted with a secondary coder (second author), who also assisted in drafting the coding rules. The lead and second authors (hereafter referred to as the research team) iteratively reviewed the codes until all coding was finalized. After completing the coding rules for level 1 and level 2 IPs, two narratives per participant were then randomly selected for reliability coding by a reliability coder, representing 15% of total photovoice narratives. At this point, training sessions for the reliability coder commenced.

Training sessions with the reliability coder were led by the research team. Precautions were taken throughout the training process to ensure the reliability coder was not exposed to these identified narratives which were ultimately used for the final reliability calculations. They began with instruction on level 1 coding rules followed by instruction on level 2 coding rules. The reliability coder received feedback on her coding of example narratives throughout the process facilitating independence in her coding. Upon completing training on level 1 coding rules, the reliability coder first coded the 24 reliability narratives for all level 1 IPs according to

the rules of the coding manual. To reinforce integrity in this process, the research team refrained from reviewing the level 1 IP codes applied to the reliability narratives from the reliability coder. As such, the reliability coder remained blind to how her codes aligned (or not) with the research team's coding of the same narratives at this stage in the process.

Next, the reliability coder was trained on level 2 coding rules. To assist with this next step of abstraction, the reliability coder was provided with a list of all possible level 2 IPs coded by the research team. In this sense, the reliability coder "matched" each level 1 IP with the most appropriate level 2 IP according to guidelines laid out at the end of this section of the coding manual ([see Level 2 Interaction Pattern Guidelines](#)). As illustrated in Figure 1 in the introduction, level 1 IPs are nested within level 2 IPs. Specifically, each unique level 1 IP will always fall under the same level 2 IP.

Finally, training continued with level 3 coding rules. Similar to level 2 IP training, the reliability coder was provided with a list of all possible level 3 IPs coded by the research team. As before, the reliability coder "matches" each level 2 IP with the most appropriate level 3 IP according to guidelines laid out at the end of this section of the coding manual ([see Level 3 Interaction Pattern Guidelines](#)). Likewise, each unique level 2 IP will always fall under the same level 3 IP. However, the nested structure of level 2 IPs within level 3 IPs was not shared with the reliability coder. Upon completion of this final step of training, the reliability coder then coded the reliability narratives at both level 2 and level 3, revising her level 1 codes as she saw fit throughout the process. The level 2 and level 3 IPs serve as the basis for reliability calculations.

Level 1 Interaction Pattern Coding Rules

The rules below describe how to code level 1 IPs. Generally, the most basic rules are provided first, and more nuanced rules are provided later. The rules are organized into four

groups: The basic format of an interaction pattern, determining whether or not an IP can be coded, rules pertaining to verbs, and rules pertaining to nature nouns. Read through all of the rules prior to beginning coding, as all applicable rules should be invoked when coding IPs.

Examples are provided for each coding rule. The relevant part of the nature experience that exemplifies the rule of interest is **bolded**, though there may be other codable human-nature interactions that are not shown as coded in the example. There are examples of fully coded narratives at the end of the document to exemplify how all the rules apply to code a full narrative.

Some of the rules come directly from past interaction pattern coding manuals. When applicable, these rules are signified with a superscript to represent the coding manuals in which they have previously appeared. These superscripts represent 1: Kahn et al. (2019) and 2: Gray & Kahn (2022).

These data are reflective of in-depth conversations about human-nature interactions. As such, it is often necessary to re-read a narrative a few times, going back and forth to understand the context of the conversation and the IPs contained therein. This may serve to make the potential application of a rule clearer. Furthermore, participants don't always offer specific language that would signify a clear IP for coding purposes. In such cases, the interviewer may rephrase portions of the conversation or offer IP language that reflects interaction with nature. If participants concur with the clarifying comments offered by the interviewer, the IP in question can then be coded (see [IP Rule 12](#) for further clarification and examples). When interviewer-participant back-and-forth is used as an example in the coding manual, words spoken by the participant are preceded by "P:" and words spoken by the interviewer (lead author) are preceded by "C:".

As with other interaction pattern coding systems, these rules and guidelines are written specifically for these data. As such, these rules may not apply equally well to or be appropriate for other narratives about human-nature interaction. However, the general principles of what constitutes an interaction pattern (described above) remain the same regardless of the data in hand. We welcome a reader to apply the rules in this coding manual to their own data, adapting as needed to best capture human-nature interactions and address their research questions.

What gets coded in an interaction pattern?

Rule 1 - The most basic format of an interaction pattern.^{1,2}

IPs consist of a verb and a nature noun, linked by a preposition as needed. Code every IP in present progressive tense verb-preposition-noun (V-P-N) form, using the participant's own words and typically only changing the verb tense, if needed. In some cases where there is no preposition, code the IP in the present progressive tense verb-noun (V-N) form. The coded noun must be a "nature noun," a feature of nature, biotic or abiotic, generally excluding any humans or human artifacts. The verb must be physical or sensorial in some way. Refer to the IP rules pertaining to [verbs](#) and [nature nouns](#) for further clarification and examples.

1. Example: "I like **collecting rocks**" → coded as *collecting rocks*
2. Example: "like **picking raspberries** on the side" → coded as *picking raspberries*
3. Example: "I **fly-fish** a lot **for trout** and stuff like that" → coded as *flyfishing for trout*
4. Example: "Christmastime came around and we went to this Christmas light show. And to me, uh, Christmas lights show like hope and for the new year will be just as good, or better than the previous year and, so, um, it was just... Well, it's not really like nature but at the same time, it kind of is; its light shows are being displayed outside, you know." → no coded IP

- a. Note that although the participant says the lights are being displayed outside, the participant does not refer to anything we consider nature in the photo. See IP [Rule 27](#) for more information.

Rule 2 - Exclude articles.^{1,2}

To fit with the standardized coding, do not include any articles (e.g., “the,” “a,” “an,” etc.) in the coded IP.

1. Example: “I **saw a jellyfish.**” → coded as *seeing jellyfish*
2. Example: “sometimes when you **look at the bark,** it can tell you like how old the tree is” → coded as *looking at bark*

Rule 3 - Include additional prepositions as needed.

There can be instances where two or more prepositions are used together to bring specificity to an interaction without which the understanding of the IP could be misunderstood. In cases where the IP is phrased in a way such that it does not fit in with the standard V-(P)-N form, you may code the IP in the V-P-(P)-N form (present progressive tense verb-preposition-(preposition)-noun).

1. Example: “Cuz I’m often **looking up at the tree**” → coded as *looking up at tree*
 - a. Note that if the above IPs been coded simply as *looking at tree*, following the standard V-(P)-N form, essential understanding of the IP would be lost without the addition of a clarifying preposition to indicate visual perspective.
2. Example: “On top of that, we had to **watch out for tides**” → coded as *watching out for tides*

Rule 4 - Include a second nature noun as needed.

Additional nouns may be included in the IP. You may code the IP in the V-(P)-N-P-N form (present progressive tense verb-(preposition)-nature noun-preposition-nature noun). If the first noun is a nature noun, the additional nature noun(s) and prepositions may be added for additional context if they can be coded from the participant's language directly surrounding the IP.

1. Example: "...**cuz you're just like jumping off a cliff.**" → coded as *jumping off cliff into water*
 - a. Note that "off cliff" is the nature feature mentioned by the participant. Based on the photo supplied and the participant narrative, we know that the participant is jumping into the water and not into/onto other types of nature (e.g., into snow, onto ground, etc.), so the additional preposition and noun "into water" are added for clarification to best represent the human-nature interaction. See [IP Rule 14](#) for additional details regarding the use of participant photos.
2. Example: "I like messing with that, going and, ah, **put my feet in the water**, something like that." → coded as *putting feet in water*

Rule 5 - Include additional descriptive information as needed.

Descriptive words or phrases from the participant's language may be coded as part of the IP if they change or add any additional meaning to the IP. These descriptions should be coded from language immediately surrounding the language used to code the verb and nature noun of the IP. In other words, first identify the verb and nature noun to code the IP, then include descriptors that directly describe the IP. Some descriptors may be specific types of nature nouns, such as a specific species of animal or tree. Occasionally, a descriptive word can be added by the

coder if the participant’s language does not succinctly communicate the interaction pattern. Generally, information that is used to guide level 2 IP coding decisions should be included as additional descriptive information (see [Level 2 IP Guideline 5](#)).

1. Example: “I’d probably be **sitting under the willow tree** with my feet in the water” → coded as *sitting under willow tree*
 - a. Note that “willow” is a specific type of trees. This may be included in the code in the sense that it is a descriptor of the nature noun “tree” in the IP *sitting under tree*.
2. Example: “I think **we came across**, uh, let’s see, **deer tracks...**” → coded as *coming across deer tracks*
 - a. Note again that “deer” is a specific type of track. This may be included in the code in the sense that it is a descriptor of the nature noun “tracks” in the IP *coming across tracks*.
3. Example: “And **Douglas fir**, when you **break the tips off**, it smells so good!” → coded as *breaking off Douglas fir branch tips*
 - a. Note that “branch” is added as an additional descriptor here to clarify the interaction described by the participant. Coding this IP also relies on [IP Rule 11](#) because the interaction isn’t explicitly discussed as something the participant enacted.
4. Example: “Umm... I guess in the background there is the tree farm. When we **cut down a tree we plant a new one.**” → coded as *cutting down tree, planting replacement tree*
 - a. Note that rather than coding *planting new tree*, the second IP in this narrative is coded as *planting replacement tree*. The descriptor “replacement” better

communicates the IP of planting a new tree in place of one that was just cut down, rather than planting a new tree in a new spot.

5. Example: “Um, I like playing in the leaves. I like **playing with friends in the leaves.**” → coded as *playing with friends in leaves*

Rule 6 - Code the most specific version of the IP.

In general, the most specific language in the participants’ narrative should be maintained in the participant’s own language when coding level 1 IPs. This applies to additional descriptors when they can be readily coded from the participant’s language, specific types of plant or animal species, particular types of food items, specific verbs used, specific prepositions, and other wording choices made by participants. These details will typically be abstracted out when coding level 2 IPs, but are important to capture the richness of participants’ nature interactions at level 1.

1. Example: “But the more that I **look at it**, there's a whole bunch **more like design and texture and it just overall is a really pretty flower**” → coded as *looking at designs in flower, looking at texture in flower*
2. Example: C: “On a full moon? Okay. What do you like to do on a full moon? Let's say if we couldn't be in this spot but **if you had the chance to go out on a full moon, what would you be doing?**” // P: “I'd probably **hike on the trail** and go up **to the top of the mountain** and just **sit there.**” → coded as *hiking on trail to top of mountain during full moon, sitting on top of mountain during full moon*
 - a. Note that coding this IP relies on [IP Rules 8](#), [11](#), and [12](#) to unite the nature nouns with the verbs “hike” and “sit,” code a hypothetical interaction, and to infer details of the IP from the interviewer’s question.

3. Example: “Sound. If you **hear** birds or owls or animals. Or the water in this place, here. Because it's just going [makes wooshing wave sound] against the side. It's just making sounds. But then you don't see any fish. **And the crunching of rocks beneath your feet, which is calming.**” → coded as *hearing crunch of rocks beneath feet*
- a. Note that coding this IP relies on [IP Rules 7](#) and [8](#) to unite the nature noun with the verb “hear” from earlier in the narrative.

What can “count” as an IP? Is there an IP here to code?

It can sometimes be difficult to tell whether one or more interaction patterns may be coded from a given section of a narrative. The following rules describe how to make decisions about what can “count” as an interaction pattern. At least one prototypical example will be provided for the application of the rule. For further clarification, some rules will also have one or more boundary case examples for which the application of the rule is less clear.

Rule 7 - Parse out multiple IPs from a list.^{1,2}

If there are multiple IPs embedded within one continuous sentence, then parse out each IP and code them individually. If one verb is used with many different nouns, use that same verb for each of the coded IPs.

1. Prototypical example: “I think it’s, um, important to **notice the differences in** like **leaves** or **in the ground**, um, or just even **plants**, like **in the change of seasons.**” → coded as *noticing differences in leaves in change of seasons, noticing differences in plants in change of seasons, noticing differences in ground in change of seasons*
2. Prototypical example: “Alright, so in this picture, it was really all of the things you can **see, the sun, the clouds, trees, the mud under the water, the sand, the water**

itself.” → coded as *seeing sun, seeing clouds, seeing trees, seeing mud under water, seeing sand, seeing water*

Rule 8 - Unite nature nouns and verbs. ^{1,2}

If the verb and the noun of the IP are in two different sentences, or even separated by several back-and-forths, but are clearly part of one IP, unite the appropriate verb, preposition, and nature noun into one IP. If there are several candidate nature nouns or verbs when forming the IP, use the more specific verb or nature noun. For example, a weather event in nature is more specific than just “nature.” Similarly, “forest” is more specific than “outside.” If several specific verbs or nature nouns are present, follow [IP Rule 7](#) to parse each out into separate IPs.

1. Prototypical example: “Yeah! Like as we were **rowing** and stuff, like, um, when she would speed up, I would speed up and then she'd slow down and I'd slow down and then kind of go, um, a steady pace where we'd stop and **let the [kayak] just kind of take us, or like the water**, or momentum, I guess.” → coded as *rowing kayak together on water*
2. Boundary example: “I like **being** in the **rain** - like I love just like, when I **see rain**, I'm like, 'oh, my god I'm gonna **go outside!**' and just **lay down and get all wet** or something!” → coded as *seeing rain, laying down in rain, getting wet in rain*
 - a. Note that the participant uses the verbs “being”, “seeing”, “going”, “laying”, and “getting.” “Seeing,” “laying,” and “getting” are the only acceptable verbs to code as IPs in this narrative (see [IP Rule 22](#)). Rather than uniting “laying down” and “getting wet” with the closest nature noun in the narrative, “outside,” the nature noun “rain” is used to better represent the interaction with a more specific nature noun.

3. Boundary example: “And even if **the flag** was up right now, right next to it to **hear it flap**, just knowing it was **the wind** for there to be an extra noise.” → coded as

hearing flag flapping in wind

- a. Note that the verb “hearing” and nature noun “wind” are united from two clauses in the sentences. Then, the descriptive information can be added to clarify how the wind could be heard (see [IP Rule 5](#)), resulting in the IP

hearing flag flapping in wind.

Rule 9 - Transform nature nouns to verbs as appropriate.^{1,2}

If the participant writes about an interaction with nature, but the potential verb is in the form of a noun, change the noun to its appropriate form of a present progressive tense verb to fit the standard IP form. See [IP Rule 22](#) for specific examples of verbs that may be changed.

1. Prototypical example: “This is the **ocean**. This was when me and Leann were **in the kayak** together.” → coded as *kayaking together on ocean*

2. Prototypical example: P: “It was kinda weird being's I was in the forest but I also could smell the smell of the ocean which was kind of unique that **I was, like, right next to the forest but smelled the ocean** which I really like the smell of the ocean.”

C: “Cool! So was that a good combination?” P: “Yeah! It actually was! And it was pretty calming - just **the view**, the scenery. But, yeah...” → coded as *viewing forest next to ocean*

- a. Note that the participant describes their view (“I was, like, right next to the forest”) and the surrounding context (“but smelled the ocean”) and later refers to this view again. The nature noun “view” is transformed into the

verb “viewing” and united with this earlier description (see [IP Rule 8](#)) to construct the IP *viewing forest next to ocean*.

3. Boundary example: “Like **I went to [named hilltop]**, um, and had some one-on-one with my house parent and, um, she kinda just waited in the car and let me step out of the car and just have my moment, **looking at the view at night.**” → coded as *looking out from hilltop at night*
 - a. Note that the noun “view” does not become the verb in this case because “looking” is already acting as the verb for this IP. Instead, this interaction is coded using [IP Rule 24](#) for viewpoints.

Rule 10 - Code the exact same IP only once per photovoice.²

Do not code the exact same IP more than once for a given photo narrative. Sometimes the participant may write about enacting the same IP more than one time in a single photo narrative, but you should still only code that IP once. If the participant writes multiple IPs that are very similar, but slightly different in terms of the verb, nature noun, or even preposition, code all those IPs.

1. Prototypical example: “So, I like **skiing** to an extent. Um, we went to [named ski mountain], um, two years ago and, um, I was like dissing at it. I was okay at **skiing**, but I wasn’t good, and we went up on a Blue Square, which is equivalent to Mt. [local mountain]’s Black Diamond, I would say, cuz it’s a **huge mountain**. And I fell, and it’s like -13 outside, it was freezing, and I get on my knees, and it was like my second time **skiing**, so I think I bit it too much that I could chew.” // [later in conversation about the same photo] “Yeah, so that **skiing** experience wasn’t the best, but, like, normally I enjoy **skiing**” → coded as *skiing on snow with friends*

- a. Note that the participant references skiing down the named mountain several times during the conversation, but the IP *skiing on snow with friends* is only coded once.
2. Boundary example: “Yeah. I would probably just be **observing everything**, participating **in nature...**” // [later in conversation about the same photo] “**Probably just observing**, walking around. Maybe taking some pictures, **looking at the different plants and species of animals.**” → coded as *observing plants, observing animals, looking at animals, looking at plants*

 - a. Note that this participant first says they are “observing everything” and later specifies that they are *looking at plants* and *looking at animals*. The earlier verb “observing” is united with these later nature nouns to code a total of four unique IPs. Despite the similarities in the verbs “observing” and “looking at,” these are all coded as unique IPs.
3. Boundary example: “They're small bushes and... at school where there's a huge grass area, there's this patch of fluffy looking **grass**. It itched. But **I still took naps there...**like a bed - an itchy bed, but a bed...” // [later in conversation about the same photo] “Um, I kinda chose...went... "plop" **I just kind of slept there** - how I **nap**, like curled up in a tiny ball. That's the way I **sleep**.” In reference to a photo of large ornamental grasses. → coded as *napping in grasses, sleeping in grasses*

 - a. Note that *napping in grasses* could be coded twice in this narrative but is only coded once. *Sleeping in grasses*, while similar to *napping in grasses*, is also coded because the language used by the participant to describe the IP is different.

Rule 11 - Code hypothetical nature interactions.

Often, it will not be entirely clear from a participant's narrative whether the participant actually enacted the nature interaction, intended to enact a nature interaction, imagined the nature interaction, or is hypothetically considering a nature interaction. In these data, we are interested in all of these scenarios as actual, intended, and imagined nature interactions can all speak to a participant's relationship with and experiences in nature. Code any nature interactions from the participant's narrative even if the nature interaction may be something the participant is only considering hypothetically. The only exception is to avoid coding nature interactions enacted by other people, see [IP Rule 17](#).

1. Prototypical example: "What would you find yourself doing - maybe without even thinking about it - you'd just automatically go do that thing?" // P: "**Probably go straight up next to that waterfall** cuz we were really far. And this picture...we didn't even get close to it." // C: "**So you would hike on over to it.**" // P: "**Mm,hmm [yes]**" → coded as *hiking up to waterfall*
 - a. Note that the photo narrative conversation revolves around what the participant would imagine themselves doing in a scenario but can still be coded as an interaction pattern. Note also that the participant originally says they would "go straight up next to the waterfall," but a more specific verb, "hiking," is offered by the interviewer. The more specific verb is used to code the IP, as "going" is not an acceptable verb (see [IP Rules 12](#) and [22](#)).
2. Prototypical example: C: "Cool. I think in your journal you had something about that and I was going to ask you...um... One of your journal questions was **imagine an ideal nature experience and what would it look like**. What would you be doing? And you

put, "sea water to fresh water separation and that you would be swimming." So is there something about **being in seawater and freshwater that you particularly liked and obviously you must like swimming...** and that would kind of go hand-in-hand with surfing..." // P: "Well, um, that was like um, underwater, like deep under water in the ocean. You know when you have oil, when you mix different oils and if you let them sit, they separate?" // C: "Yeah, yeah..." // P: "Yeah, you can actually see that line (excitement in his voice) underwater! It's weird." // C: "Okay, I getcha. I've heard about that." // P: "Yeah." // C: "Have you seen that?" // P: "**I've never seen it in real life but I want to.**" → coded as *swimming in boundary between seawater and freshwater, seeing boundary between seawater and freshwater*

- a. Note that the interviewer offers the IP *swimming in seawater and freshwater* when asking about what the participant would ideally like to do in nature.

Although the participant says they've never seen the boundary between seawater and freshwater, they would like to see it, and presumably, swim in it. Both of these interactions can be coded as hypothetical IPs. Coding these IPs also relies on [IP Rule 12](#). Note also that "edge," "line," "boundary," or similar could have just as accurately been used in the IP, e.g., *swimming in edge between seawater and freshwater*.

Rule 12 - Infer IPs from interactions offered by the interviewer.

If an IP is offered by the interviewer (C) and the participant (P) affirms that they enacted or would enact the IP *and* offers additional details or language related to the interaction, the IP can be coded. Only a clear affirmation of the IP with accompanying details provided by the participant should be coded. The interviewer's language should be used to code the IP unless the

participant revises the IP by using a different verb and/or nature noun. If the IP has already been coded elsewhere within the conversation about that particular photo, the IP does not need to be inferred from the interviewer-offered IP.

1. Prototypical example: C: “And so it sounds, well, I’m assuming, but it sounds like you’ve got a lot of experience **camping** and **backpacking** and being outside...” // P: “**Yeah, I’m confident enough in my own skills to be able to...**I can fish, I can identify some plants - obviously I’m not going to do it if I don’t know for sure, but there was salmon berries, um, I’m not sure if there was huckleberries but there’s definitely...yeah...” → coded as *camping in nature, backpacking in nature*
2. Prototypical example: C: “...What else do you like to do in nature that helps you [relax]?” // P: “[**after a long pause**] **...climbing**” // C: “**Climbing? Climbing the trees or climbing rocks or mountainsides?**” // P: “**Yeah, all of them, just climbing on everything.**” → coded as *climbing on trees, climbing on rocks, climbing on mountainsides*
 - a. Note that the participant offers the preposition “on” when affirming the interviewer’s suggested IPs. The preposition “on” is included in the coded IPs to honor the participant’s choice of language (see [IP Rule 6](#)).
3. Boundary example: C: “Wow! **So incredible views...**and that looks like it’s shaping up to be an incredible **sunset...**” // P: “**Yeah**” // C: “...then with the fresh **powder**, and, oh...” // P: “**Mm,hmm...just pretty.**” → coded as *seeing sunset, seeing powder*
 - a. Note that the participant does not provide many more details when responding to the interviewer but does affirm the suggested IPs and comments on the beauty of

the sunset and powder. This affirmation with minimal additional details allows for the IP to be coded.

4. Boundary example: C: “Okay. So you'd be willing to reach in over the kayak and **dip your hands in the water?**” // P: “**Yeah.**” → coded as *dipping hands in water*
 - a. Note that the participant does not offer any additional language when affirming the IP. However just prior to this statement, the participant talks about touching cold water, thus providing sufficient affirmation to code an IP here.
5. Boundary example: C: “Yeah, that's gorgeous. I love it. I love all the snow. I love the snow on the branches.” // P: “Yeah.” → no coded IP
 - a. Note that the interviewer does not offer a specific IP, only describes what they like about the scene. To code an IP offered by the interviewer, the IP needs to clearly have both a verb and a nature noun, plus at least some additional language offered by the participant.

Rule 13 - Transform some environmental descriptors into IPs.

Descriptions of the environment can sometimes be used to code an IP if the descriptions are ones that would have necessitated a physical or sensorial interaction with the environment. First, if a verb is offered elsewhere in the narrative in reference to the interaction, unite the verb and nature noun to code the IP (see [IP Rule 8](#)). Otherwise, if a nature noun appears to be a focal part of the participant’s experience, but no physical or sensorial verb accompanies the noun, an IP can still be coded using certain default verbs. The nature noun may only be coded if there is enough information from the participant to indicate that they physically or sensorially interacted with the nature noun. For most interactions, the appropriate verb will be *seeing*. However, some interactions may warrant other sensory verbs, such as *smelling* (for scents), *feeling* (for textures,

etc.), or *hearing* (for sounds). If an equivalent IP would be coded elsewhere within the narrative, the IP does not get coded here.

1. Prototypical example: “We saw a lot of crabs also, **it kind of freaked me out how many jellyfish there were.**” → coded as *seeing jellyfish*
 - a. Note that the participant notices the number of jellyfish as something that “freaks” them out. It is implied that the participant is able to *see* the jellyfish in this experience because they perceived a quantity of jellyfish.
2. Prototypical example: “Well, um, it's when the day gets kind of cooler. And it's like the kind of **cooler** where **your nose is pink and your cheeks are rosy**” → coded as *feeling cool air on nose and cheeks*
 - a. This participant includes details about how her experience of cold air affects her body, indicating that she had physically or sensorially experienced the cold air. Therefore, these environmental descriptors can be coded.
3. Boundary example: “you can **see the clouds** that are kind of like going at like an angle right there. Just like **the beauty of the water reflecting it and the island to the right kind of...reflecting.**” → coded as *seeing clouds reflected in water, seeing island reflected in water*
 - a. Note that three potential IPs are coded as two IPs by combining several coding rules and uniting elements of IPs across the participant’s narrative. First, seeing clouds can be coded in a straightforward fashion.
 - b. Then the second sentence presents two possible IPs that require an inference of the verb “seeing”. These IPs would be something like *seeing water reflecting it* and *seeing island reflecting*. Uniting language from the first and second sentences

to replace “it” and make clearer what is “reflecting” results in the IPs *seeing clouds reflected in water* and *seeing island reflected in water*

4. Boundary example: “But what was really neat about this one was the scenery. **It was really pretty with the ocean to the right of you** and then these, like, **you couldn't see anything in the forest**, but yeah, it was really cool.” → coded as *seeing ocean*, *seeing forest*
 - a. Note that “ocean” is a nature noun that is central to this participant’s description of their experience. The participant’s description of the ocean as “pretty” and “to the right of you” indicates that they visually perceived these characteristics of the ocean.
 - b. Note also that although the participant describes not being able to see anything “in” the forest, it is implied that they are seeing the forest itself.
5. Boundary example: “It was pretty humid.” → no coded IP
 - a. Note that it is not clear that the participant physically or sensorially experienced this characteristic of the air, so no IP is coded.
6. Boundary example: “Oh, it was...I don't think it was breezy, it was just, like, somewhat cold. Like not really like, too cold, but just... I hate it when it's like cold out but also sunny. Like it contradicts itself (laughs)! Like, why is it cold but the sun's out and it's a barely clouded sky? But, yeah...” → no coded IP
 - a. Note that it is not clear that the participant physically or sensorially experienced these characteristics of the temperature, so no IP is coded.
7. Boundary example: P: “Okay. Um, I seen that the trees were with no leaves, well this kind of reminds me of the winter because in the winter, there's no leaves. Um, and **there**

was a breeze and the trees had no leaves and there's a breeze so I was like this can make up the winter breeze. And the river was right over there and there was some snow on the grass so I thought it was a good mix. And then, I was like admiring...again, this was another place where you could walk and admire all the things that you see around you, so, yeah..." // C: "And you don't get chilled when there's a breeze?" // P: "You do get a chill, um, but again, I like the cold!" // C: "You like the cold so you appreciate the breeze?" // P: "Yeah." → coded as *feeling breeze*

- a. Note that through conversation with the interviewer, the participant offers several details that indicate she physically or sensorially experienced a breeze, so the IP *feeling breeze* can be coded.

Rule 14 - Use participant photos to infer certain IPs.

In some cases, the participant may refer to nature in a vague way because their photo illustrates the nature they are referring to. In these cases, you may be able to code an IP by uniting the language the participant offers in the caption, in the first few things they said related to the photo, or by inferring information from the photo itself. This rule will often be combined with other rules to successfully code an IP (see, e.g., [IP Rule 5](#)).

Additionally, if the participant discusses direct interaction with the nature depicted in their photo (i.e., they are not using the photo merely as symbolism but instead refer to specific experiences with the nature depicted), the photo may be used to code IPs in conjunction with [IP Rule 13](#). See example 5 below for further clarification.

1. Prototypical Example: "Uh, and **I really like this view** and the rock was really pretty." In reference to a photo of a rock on the shore of the water → coded as *viewing waterscape*
 - a. Note that the noun "view" is transformed into "viewing." See [IP Rules 9](#) and [24](#).

- b. Note also that the nature noun here is inferred as “waterscape.” It is not entirely clear what the participant considers to be most appealing about the view, so the coder must determine a characterization of the photo. Since reliability will be calculated for level 2 IPs, the guidelines for coding level 2 IPs can be useful in determining a level 1 code in these cases.
2. Prototypical Example [Answer to question “What are we looking at and what makes it important?” for a photo captioned “The Second Sunset”]: “This was the second day when we went out a little bit farther on this one. This one was more or less focused on the...that you could **see** out way far, in the middle of the picture, the islands. It was just saying how big the earth actually is and **how crazy the view from here**, again, is as you can see the clouds that are kind of like going at like an angle right there.” → coded as *seeing sunset over water*
- a. Note that the noun “view” is not transformed into the verb, as the participant used the verb “seeing” in the previous sentence.
- b. Note also that while the caption is “The Second Sunset,” an additional detail from the participant’s language and photo is included in the IP: that the sun was setting over water. Thus, the resulting IP is *seeing sunset over water*.
3. Prototypical: “This is a picture of one of our **pine trees** out in our ponderosa pine forest. It's just natural so this forest in our backyard has been here for a while. I want to say it's like 70 acres or something? And this is a picture, you can kind of see it, right after a rainstorm, you can kind of **see little water raindrops on there**.” In reference to a photo of a small pine tree covered in water droplets. → coded as *seeing raindrops on pine trees*

4. Prototypical example: “we got there like 6:00 in the morning and it was this cool **river** and, um, cuz we were going **fishing**, and, so 6:00 to probably about noon, we hadn't caught anything.” In reference to a photo of participant holding a fish while standing on a boat in the middle of a body of water. → coded as *fishing from boat on river*
5. Prototypical example: “Um, with this one, it's important to me because **it has raindrops on it** and it catches the raindrops. And so it has the raindrops on it and **has little veins** where it absorbs the water for the tree, so it helps the trees, so it had a purpose and makes me feel good inside because it looks kind of calm cuz it seems...it seems nice **looking** and it's green. I like the color of green. I didn't touch it because it might break and the tree needs the leaves. But being in nature and seeing stuff like this kind of makes me want to do research because I'm just like, "why this leaves need" I mean trees need leaves but why does the leaves fall and how does the tree absorb water if it doesn't have its leaves anymore? Which makes me kind of curious.” In reference to a photo of two leaves with raindrops on them attached to a **tree branch**. → coded as *looking at tree branch, seeing raindrops on leaves, seeing veins on leaves*
6. Boundary example: “I feel like I'm neither. I feel like I'm both of them at different times. Um, if I've been on like the [group home] trail, I've been on it like so many times like sometimes I like speeding up and really just stopping and taking a breath and be like, wow, **like this is a beautiful view**. And I'll like ask to borrow a phone and then just take pictures of all the things that I have interest in and that I find really pretty.” In reference to a close-up photo of a pink flower. → no coded IP
 - a. Note that neither this portion of the narrative nor the photo provides sufficient information to code an IP. There is no indication of the direction in which the

participant is looking (e.g., out from mountainside, up from trail, etc.) nor what the view is (e.g., sunset, hills, city, etc.). The photo does not provide information relevant to the “beautiful view” seen by the participant since it’s a close-up photo.

Rule 15 – Code social information with the most foundational IP

If a participant describes a nature experience that occurred with other people and describes multiple codable IPs, code the social information as part of the most foundational IP. By most foundational IP, we mean the interaction pattern(s) that, if they had not taken place, other IPs could not or would not have followed.

1. Prototypical example: “Okay, um, so...so during [COVID-19] quarantine, I couldn't really see my friends too much, cuz like [group home] had all these specific rules like you can't go see anybody. So we're in Phase 2, or then, I had to get, like, my friend's background checked from his parents, all the stuff like that. It was just a long hassle, and it took FOREVER, oh, my lord, it took forever, such a long time. But at the end of it, it was worth it cuz **I got to hang out with him**. And this was **after the long hike up**, so this is a **trail up at Mt. [Local Mountain]**, and um, **we got to hike up it**, and then this picture, is just crazy cuz it's really like, **you can see for miles and miles** and then we posted them on Instagram and stuff. But that was cool.” → coded as *hiking up mountain for view, hiking up trail to destination point with friend, looking out from mountainside*
 - a. Note that three IPs are parsed out from this narrative, even though they are somewhat similar:
 - i. The first IP, *hiking up mountain for view*, is coded from the participant referring to the “long hike up” and getting to a view at the top of the

mountain. The participant doesn't refer to his friend explicitly in this part of the narrative, so the social information is not coded here.

- ii. The second IP, *hiking up trail to destination point with friend*, is the most foundational of the IPs in the sense that neither of the other two IPs would have been possible without first *hiking up trail*. This IP is coded from the participant referring to “a trail up at Mt. [Local Mountain], and um, we got to hike up it,” in which he explicitly says “we.” Therefore, this is the IP that includes social information.
- iii. Finally, the third IP, *looking out from mountainside*, is coded from the participant saying, “you can see for miles and miles.” This IP is coded using [IP Rule 24](#).

2. Prototypical example: P: “It’s just really special **because I actually went biking for the first time on a trail and it was with someone close to my age**, someone...one of the houseparents I knew better and it's just...it just felt...they taught me that biking isn't just about how you feel. It's about how everything feels. It's about how your emotions feel. It's about how the others with you feel. It's about how the nature around you, how you can observe it and just feel...feel how it feels.” // C: “So describe how you were feeling when you were off biking on that trail.” // P: “mmm...I was kind of scared because it was my first time and there were a lot of steeper hills and **I don't like biking down steep hills.**” → coded as *biking with others on trail, biking down steep hills*
 - a. Note that the participant explicitly references a friend when talking about *biking on trail*, so this IP is coded with this social information. Moreover, *biking down steep hills* would not be possible if not for first *biking on trail*.

- b. Note also that if the participant had explicitly referenced their friend again when talking about biking down steep hills, both IPs could be coded to include social information.

Rule 16 - Code nature acting on participants.²

If nature enacted an interaction pattern on the participant, the interaction can be coded as an IP. The leading present-progressive tense verb in these cases will be “being.” IPs enacted by nature on non-participants are not coded as interaction patterns unless the participant wrote that they saw, heard, or otherwise perceived the interaction, in which case the IP will follow the form V-(P)-N-P-N.

1. Prototypical example: “And sometimes it supports me when...if I fall onto it. Sometimes **it [tree] catches me.**” → coded as *being caught by tree*
2. Prototypical example: “But **I’ve been stung, by like, man-of-wars** before and stuff like that and it is NOT fun (laughs)!” → coded as *being stung by man-of-wars*
3. Boundary example: “I like **being rained on.**” → coded as *being rained upon*
4. Boundary example: “...there’s this patch of fluffy looking grass. It itched.” → coded as *being itched by grasses*

Rule 17 - Do not code non-participants’ IPs.^{1,2}

Do not code IPs that are not enacted by the participant themselves. In other words, if the participant writes about the actions of someone they were watching, do not code those IPs.

1. Prototypical example: “I feel like everybody is like comfortable with each other. **They told stories** and stuff like that, so like, getting along.” In reference to a photo of friends and family huddled around a campfire in the snow → no coded IP

- i. Note that the IP *telling stories around campfire* could potentially be coded here. However, since the participant describes others as telling stories, not themselves, no IP is coded.
2. Boundary example: “And my grandma and I used to plant morning glories together.” → coded as *planting morning glories with grandma*
 - i. Note that the participant engaged in this interaction *with* their grandmother, so the IP *planting morning glories* may be coded in this case. “With grandma” is included in the IP because this is social information (see [IP Rule 15](#)).

Rule 18 - Do not code technologically-simulated IPs.

We aim to understand nature interactions that involve interaction with “actual” nature, rather than technologically simulated nature. For this reason, we do not code interactions that only involve photographed nature, video-recorded nature, sound recordings, or similarly simulated nature. However, the action of photographing or recording nature *in* nature may be coded, as well as listening to or playing recordings if the participant is doing this in or with nature.

1. Prototypical example: “Um, I used to be terrified of snakes but one day I got bored and I just started watching videos about snakes and I just fell in love-they're just so cute!” → no coded IP
2. Boundary example: P: “I actually had an app on my phone that, um, that kind of mimicked every bird sound that you kind of heard and, um, we went to, um, I was in Seattle and we went to like a zoo but it had mostly birds and like stuff like that. And I remember going in there and **I would like have my phone out and it would like copy it and it's like they were like talking to my phone and like they knew like I was**

recording or something and it was really strange but also really cool at the same time!”

// C: “Wow! And so this was something that **you'd record and then you'd play back to them?**” // P: “**Yes.**” → coded as *recording bird sounds, playing recorded bird sounds for birds*

- a. Note that although the recordings of bird sounds are technologically simulated nature, the participant uses this technologically simulated nature to directly interact with real birds in a zoo. Since this interaction involves interaction with nature itself, not just simulated nature, it may be coded.

Rule 19 - Specify interactions mediated by cars or windows.

Nature interactions experienced through a window or in a car may be coded, but this information must be included within the IP. If an interaction takes place through a window, the IP should end with *through window*. If an interaction takes place in a car, the IP should end with *through car window, while in car*, or similar, as appropriate.

1. Prototypical example: “Yeah. Um, well, I like, um, **looking out the window in a car**, at all the different things cuz you get to see really interesting things. Like this one time I think we **saw** this **giant moose** and it was just like, you know, kind of blocking like just...and like we saw we a lot of different animals. I think we saw like **black bear** once, and it just kind of was like out there in nature...” → coded as *seeing moose through car window, seeing black bear through car window*
2. Prototypical example: “I don't know, probably looking outside through a window or having the sun coming through the windows like in the morning, you open the blinds and the **sun is like shining through the windows**. Or just earlier today, me and N were in the herbology and ...our herbology room which like the tower up there...and the sun was

like up here and it was like shining through the windows and um, **the heat was really nice**, just like having the **heat of the sun** when it was colder everywhere.” → coded as *seeing sun shining through window, feeling warmth of sun through window*

- a. Note that the IP *seeing sun shining through window* relies on [IP Rule 13](#) to code the default verb “seeing” from this environmental descriptor.

3. Boundary example: “**That was a picture while we were in the car**, um, and I really enjoy car rides like really long car rides. And I think this car ride was like five hours, um, and there were like...I can't remember what **mountain** that is, um, but **I was taking A LOT of pictures as we were driving.**” In reference to a photo of a mountain → coded as *photographing mountain through car window*

- a. Note that participant does not explicitly say they photographed the mountain themselves but offers enough information to assume they took the photo of the mountain while “taking A LOT of pictures as we were driving.” Since the photo was taken from the car, the IP ends with *through car window*.

Rules pertaining to verbs

Rule 20 - Coding re-attempted interactions.

There can be instances where participants reference a reenactment of a particular IP. Such occasions often refer to an instance where the re-engagement with an IP is a testament to overcoming a challenge of some type. When such an IP is recognized, g “Re-” to the present progressive tense verb in the standard V-(P)-N form signifies the conscious willingness of the participant to reenact the IP.

1. Example: (In reference to sharing a favorite memory of climbing a tree) “Probably falling down on accident because it gives me a lot of input and teaches me **to climb back up again.**” → coded as *re-climbing tree*

Rule 21 - Coding interactions that were avoided.

There can be instances where a participant specifically references avoiding or purposefully not engaging in a nature interaction, such as avoiding tripping over rocks. These IPs may be coded by using the verb “avoiding” in front of the present progressive tense verb of the nature noun. However, do not code avoided interactions that are part of a hypothetical scenario; it should be reasonably clear that the participant is speaking about something they actually did or experienced. Any IPs the participant engaged in instead may still be coded as usual.

1. Example: C: “Did you have to like walk single file?” // P: “Yeah, I think we had to go single file. It was a couple years back, but I just remember being like...really a lot of **trees** and like **having to duck** and stuff which I had never...” → coded as *ducking under trees*

Rule 22 - Acceptable verbs.^{1,2}

Only code clear physical or sensorial human-nature interactions, excluding any emotional verbs in the coded IP. Sometimes it is difficult to tell whether a verb counts as physical and/or sensorial, thus we have provided a list of some verbs encountered in the data that can be coded in the IP, in addition to a list of some verbs that cannot be coded in the IP.

1. List of some verbs that can be coded as part of an IP:
 - i. Avoiding
 - See [IP Rule 21](#).
 - ii. Biking

- Code only if the participant specifies that they were riding a bike (of any kind) in or on what we define as “nature” or a nature noun.
- iii. Bird watching
 - Code as *watching birds*.
- iv. Breathing
 - *Holding breath* may also be coded.
- v. Building
 - Code only if the participant can be reasonably assumed to be building with materials found in nature or building in nature.
- vi. Camping
 - Code as *camping in nature* if there is no nature noun present.
- vii. Crabbing
 - If no nature noun is provided, this verb can be coded as the default IP *crabbing in ocean*, if the ocean was referenced the narrative at some point during this conversation. Otherwise, just code as *crabbing in water* (there are freshwater crabs and saltwater crabs).
 - a. Example: “It would be so much fun to have a boat...**go crabbing**, catch some fish, and sit and enjoy the view while you’re getting something to eat.” → coded as *crabbing in ocean*
- viii. Caring
 - “Caring” may be coded as a verb in an IP if it is used in the sense of “caring” for a biotic part of nature, such as a plant, animal, etc.

ix. Checking

→ “Checking” may be coded as a verb in an IP if it is used in the sense of “checking in” or “checking on” what we consider nature.

x. Coming

→ “Coming” may be coded if it is followed by a preposition such as “across,” as in “coming across” something we consider nature.

xi. Discovering

xii. Drawing

→ Drawing may be coded if the participant can be reasonably assumed to be drawing *in* nature. In other words, if a participant is drawing a sunset based on a photo of a sunset or just drawing a sunset from memory while in their bedroom, “drawing” should not be coded as an IP.

xiii. Eating

→ Code only if the eating took place in what we would consider “nature”. Though food is a non-human natural substance, most food cannot itself be the “nature” noun unless it was clearly gathered, foraged, or otherwise collected in nature. See [IP Rule 25](#) for rules pertaining to coding food and other edible materials as nature nouns.

- a. Example: “And, um, also, so for them, the tradition is to eat the heart of your first cutthroat and, since it was my first one, **I had to eat the heart...and I just took it and just swallowed**

it!” → coded as *eating heart of cutthroat trout, swallowing heart of cutthroat trout*

1. Note that “swallowing” is also an acceptable verb, with the same conditions as the verb “eating.”
- b. Example: “Um, it's just...it's an old Indian reservation but there wasn't anything to it. Like, um, they have a Taco John's and that's the only place you can eat there.” → no coded IP
1. Note that there is insufficient information about whether the participant ate *in* nature; the only information regarding food describes a restaurant. Therefore, no IP is coded.
- c. Example [First part of participant narrative about a photo of participant holding a fish on a boat on a river]: “it was this cool **river**, and, um, cuz we were going fishing, and, so 6 to probably about noon, we hadn't caught anything. And **we were eating lunch...**” → coded as *eating lunch on boat on river*
1. Note that the phrase “on boat on river” is inferred from the participant photo on a boat and surrounding language about being on the river (see IP Rules [4](#) and [14](#)).

- xiv. Exploring
- xv. Eye-balling
- xvi. Feeling

→ Code “feeling” as an IP verb only if the feeling is clearly used in the sense of feeling a texture or other physical stimulus through the sense of touch.

a. Example: “It’s like a bush which I went over there, **it felt a little pokey**, a little bit.” → coded as *feeling pokey bush*

1. Note that the addition of the descriptor before “bush” is allowed based on [IP Rule 5](#) where clarification is needed to understand the precise nature of the IP.

Without clarification, the IP can easily represent a very different type of interaction.

xvii. Finding

xviii. Getting

→ If the verb “getting” is used in the sense of “gathering” or “collecting,” substitute the verb “gathering” instead.

a. Example: “I would clean their pens, like the chicken pen and the duck pen which...because I hate having the dirty pen, and it's like so gross, and I love just putting a new blanket of wood shavings, **getting all their eggs...**” → coded as *gathering eggs*

→ If the verb “getting” is used to describe an environmental norm on the youth group home property, substitute the most appropriate default verb according to rule E.

a. Example: C: “So what sorts of wildlife do you typically find like out here at the tree farm and around the campus? What's

common?” // P: “...Um, **we get a lot of deer. Sometimes coyotes, rabbits.** Um, just a lot of like **squirrels, birds, just your common forest animals and plants.**” → coded as *seeing deer, seeing coyotes, seeing rabbits, seeing squirrels, seeing birds*

xix. Hammocking

- a. Example: “I had my **hammock set up like right over the water**” → coded as *hammocking over water*

xx. Hiking

- Code only if the narrative includes a description that suggests the hike took place in what we define as “nature.” If no nature noun is present in the narrative that would constitute the IP but it is clear the IP took place in “nature,” code as *hiking in nature*.

xxi. Identifying

xxii. Making

- “Making” may be coded as a verb in an IP if it is used in reference to creating something out of natural materials.

xxiii. Meditating

xxiv. Memorizing

- Code only if the participant is memorizing something they have perceived in nature, such as a landscape, a bird call, etc.

xxv. Picnicking

→ Only code “picnicking” as an IP verb if the picnicking is specified to be in what we define as “nature”.

xxvi. Photographing

xxvii. Putting

→ “Putting” can be coded as the verb in the IP if it’s used in the sense of “placing” a body part or a codable nature noun somewhere. If used in reference to a body part, the body part should be “put” somewhere we consider nature.

xxviii. Raising

→ “Raising” can be coded as the verb in the IP if it’s used in the sense of “raising” an animal, plant, or other biotic form of what we consider nature.

xxix. Reusing

→ Code only if what is being reused is a specific nature noun. See [IP Rule 27](#).

a. Example: “we would **reuse** some of the **extra wood material and such for firewood**” → coded as *reusing tree for firewood*

xxx. Rock climbing

→ Code as *climbing up rocks* or *climbing up rock* as appropriate.

xxxi. Sheltering

xxxii. Skiing

→ Code as *skiing on snow* if no nature noun is present in the narrative (these data do not have any references to water-skiing).

xxxiii. Sledding

→ Code as *sledding on snow* if no nature noun is present in the narrative.

xxxiv. Sleeping, napping

→ Code only if the participant talks about sleeping or napping in nature or with a non-human animal. The variation “falling asleep” may also be coded.

xxxv. Snowboarding

→ Code as *snowboarding down mountain* if no nature noun is present in the narrative, such as “hill” or “snow.”

xxxvi. Storm watching

→ Code as *watching storm*.

xxxvii. Wandering

xxxviii. Working

2. List of some verbs that typically cannot be coded as part of an IP (exceptions provided):

i. Being

→ “Being” cannot be coded as an IP unless it is in reference to nature enacting an interaction upon the participant (see [IP Rule 16](#)).

a. Example: “I like being in the rain” → no coded IP

→ “Being” can, however, be coded if it’s in reference to being alone or in solitude in or with nature.

- a. Example: “It just feels nice to **be alone with nature** and the environment.” → coded as *being alone with nature*
- ii. Enjoying
- iii. Experiencing
 - “Experiencing” can be coded as the verb in the IP only when the coded IP is *experiencing quiet in nature, experiencing silence in nature, or experiencing seasons*.
- iv. Going
 - Going can be coded as the verb in the IP only if the preposition following the verb is “into” or “against,” is paired with what we consider nature, and is not a hypothetical interaction (see [Types of Interaction Patterns](#)).
 - a. Example: “It's like going against the waves – just to start flowing with them. Cuz you have to go out there and then you get on the board and then you take the wave all the way to the shore.” → coded as *going against ocean waves*
- v. Growing up with
- vi. Having
 - Do not code “having” as an IP verb in the possessive sense. If the verb “having” is used in conjunction with another verb (e.g., “Having eaten our dinner, we began hiking...”), use the other verb to construct the IP.
- vii. Helping

viii. Keeping

→ Do not code “keeping” as an IP verb in the “maintaining” sense if it refers to abstract conditions (e.g., “keeping nature safe”).

ix. Learning

x. Living, living with

xi. Relaxing

xii. Saving

xiii. Sharing

→ Do not code “sharing” as an IP verb unless nature elements or edibles captured, harvested, or foraged in nature are being shared.

xiv. Spending time

xv. Trying

→ Do not code “trying” as the verb in the IP, but the interaction that the participant attempted may be coded as an IP according to the other rules. For example, the IP *climbing mountain* would refer to the process of climbing a mountain, rather than the achievement of *summitting mountain*. Thus, a participant who tries to climb a mountain could be considered to have enacted the IP *climbing mountain*.

Rules pertaining to nature nouns

Rule 23 - Coding proper nouns as nature nouns.

A proper noun can be coded as a nature noun. When possible, use the most specific version of a nature noun, such as a proper noun. However, for the purposes of this public coding manual, identifiable locations are redacted.

1. Example: “I believe **this was** [named mountain], I wanna say... Which, personally, is my favorite place to go, probably in the world, because the view and the **snowboarding** is just SO good.” → coded as *snowboarding at [named mountain]*
2. Example: “Okay, so this is the rose garden at [named park]” → coded as *seeing rose garden at [named park]*

Rule 24 - Coding viewpoints as nature nouns.

Participants often refer to a view either from a particular location or as a destination spot. These views and viewpoints may be coded as a nature noun if they are what we consider to be “nature.” However, since these views may be described over the course of a conversation, it can be difficult to find a precise IP to code. If an IP referring to a view from a vantage point cannot be readily coded from the participant’s language in the verb-(preposition)-noun form, the IP *looking out from hillside, looking out from tree*, or a similar IP may be coded using as much language as possible from the participant. If an IP referring to a view as a destination spot cannot be readily coded from the participant’s language in the verb-(preposition)-noun form, the IP *hiking to viewpoint, hiking for view, climbing up to viewpoint*, or a similar IP may be coded using as much language as possible from the participant.

1. Prototypical example: P: “Um, I like hills. **Like I like to go up the hill** or like, for this one, it's more like, I'm not really sure what that is, it's like straw-wheat or something like that...but um, I don't really enjoy that but I'll tolerate it, because at the end of it, it's like, wow! The view up there is always super nice! It doesn't have like a bad view, you know?” // C: “Mm, hmm.” // P: “So, I like that. But then, the other one was the winery road which is a monster hill, but **at the top of it is a crazy view.**” // C: “Okay.” // P: “I should've had pictures of that...” // C: “Oh, that's okay!” // P: “**It's a cool view. It's like all of [city], almost.** You can see, like, the hospital, so...” // C: “Wow. So having a good view is important.” // P: “Yeah! Yeah, yeah.” // C: “**Where you can see out.**” → coded as *looking out from hillside*
 - a. Notice that the participant describes being on top of or getting to the top of a hill, which becomes the vantage point coded in the IP (“hillside”). There is not a clear verb to be used, but the participant is talking about a view from their vantage point, so the default “looking out from” is coded.

2. Prototypical example: “It was exciting because I wasn't the wildest kid so just being able to **climb up into a tree** and just be able to **see everything around me** is just a really exhilarating experience. And it made me really happy.” → coded as *seeing everything from up in tree*
 - a. Note that the vantage point for “seeing everything around me” is a tree, so this becomes part of the coded IP. Multiple prepositions are used to code this IP, see [IP Rule 3](#).
 - b. Note also that *climbing tree* is coded earlier in the narrative and is therefore not coded here, see [IP Rule 10](#).

3. Prototypical example: C: Okay. But you guys hiked way up to this spot...” // P: “Yeah.”

// C: “...to look over, wow, okay. You guys were up pretty high, then. Was that **a long**

hike to get up to that view point?” P: “(affirmative) Uuummmm...it's like a couple

miles...” → coded as *hiking up mountain to viewpoint*

- a. Note that coding this IP relies on [IP Rules 12](#) and [14](#) to code the IP from the language offered from the interviewer and infer the nature noun “mountain” from the photo and earlier parts of the narrative.

Rule 25 - Coding food and wild edibles as nature nouns.

Food, tea, and other edible items can be coded as nature nouns if they were hunted, foraged, captured, gathered, harvested, or otherwise in or from what we define as nature. Harvesting, foraging, and otherwise collecting food from nature is a common and important practice in the context of the youth group home, so we interpret participants’ references to food in nature generously when coding interaction patterns. The precise type of food or edible should be included in the IP when possible, but if the type of food is unknown or ambiguous, the nature noun “wild edibles” may be used. If berries, plants, or other wild edibles are mentioned by participants in the context of food or eating, but the participant does not say precisely that they picked, foraged, or collected those edibles, they may still be coded. If tea is mentioned by a participant, unless there is a specific reference to bagged or purchased tea, it may be coded using the nature noun “foraged tea,” since foraging for tea ingredients and then brewing tea is a common practice in the group home community.

1. Example: “It's always fun to, like, **eat or make a dinner out of something that the ocean or the land provided** for you.” → coded as *eating wild edibles, making dinner from collected wild edibles*

- i. Note that the verb “collected” is added to the second IP. g “collected” to actions “making dinner” helps communicate that the edibles were likely collected in some form by the participant, as opposed to, for example, cooking wild-caught salmon they bought at the grocery store.
2. Example: “**we're eating food from our garden** so it's sustainable farming...” → coded as *eating food from garden*
 - i. Note that the participant specifically said the food came from their garden, so the participant's language is used to code the IP, rather than the nature noun “wild edibles.”
3. Example: “so you could **catch fish**, so I mean it's easily...you could easily live there. And live off of the resources if, obviously, you know what you're doing, ah, but yeah, **there was salmon berries** and you'd probably bring food with you just in case.” → coded as *catching fish, foraging salmonberries*
 - i. Note that *catching fish* and *foraging salmonberries* both retain specificity about the food items caught or foraged in nature.
4. Example: “Yeah probably cuz this was at the...where I took the picture of the pretty view...**drinking tea**...” → coded as *drinking foraged tea*

Rule 26 - Coding imagined or visualized imagery as nature nouns.

Participants will sometimes reference seeing a particular figure, image, shape, or other pattern in nature, such as an animal shape in cloud formations. These nature interactions should be coded following the form *visualizing* [noun] *in* [nature noun], regardless of the verb used by the participant. If the nature noun is ambiguous, use the default “in nature”.

1. Example: “I just look to **see images of...the clouds can make or the animals that fly through.**” → coded as *visualizing animal shapes in clouds*
2. Example: C: “So are you **seeing the giraffe** in the clouds or the giraffe - I think it's like a tree or the grass or something.” // P: “Yeah, **it's a tree or grass or something. It just looks like a giraffe...**” → coded as *visualizing giraffe shape in tree*

Rule 27 - Acceptable nature nouns. ^{1,2}

Interaction patterns must represent an interaction with “nature”, meaning the noun (or the second noun, if in the V-(P)-N-P-N form) in the IP must specifically be a nature noun. For the purposes of this study, nature is defined as non-human features of the external world, both biotic and abiotic, excluding all human-made artifacts aside from those listed below. Humans are, however, considered nature. Human body parts may work as the second nature noun provided the first noun is a nature noun to be coded.

1. Example: “...**feeling the rain on my face...**” → coded as *feeling rain on face*
2. Example: “I like touching things.” → no coded IP
3. Example: “Sometimes I have to get that sensory input and so I go outside and **I touch the trees and feel the roughness of them...**” → coded as *feeling roughness of trees*

Sometimes it is difficult to tell if a word should count as a nature noun. Thus, we have provided a list of some nouns encountered in the data that can be coded as a nature noun, in addition to a list of some nouns that cannot be coded as nature nouns:

List of nouns that can be coded as nature nouns in an IP (alphabetical order):

- i. Air
- ii. Christmas tree(s)

→ Participants are involved in growing, caring for, and selling Christmas trees at the youth group home.

iii. Colors, patterns, or textures

→ If a participant talks about looking at, feeling, finding, or otherwise encountering a color, pattern, texture, or something similar in nature, it can generally be coded as a nature noun. However, for the sake of clarity, if a second nature noun is not readily coded from the participant's narrative, add "in nature" as a second nature noun.

- a. Example: "I think it's interesting to **find swirls in nature** cuz they're just so, it's just perfect." → coded as *finding swirls in nature*

iv. Domesticated animals, such as dog(s), horse(s), cat(s), etc.

v. Garden

vi. Landscape

vii. Lookout tower

→ If a "tower" clearly in a natural environment is a part of the participant's nature experience, the tower can be coded as the nature noun "lookout tower." The photovoice photos may also be used to provide context when determining the appropriate nature noun.

- a. Example: "So **we went up this tower thing** and it was kind of like a...so some of the steps were kind of not intact, so you'd have to skip steps and stuff like that, but it was cool at the end

cuz I love the picture from that view.” → coded as *climbing up lookout tower*

1. Note that the photo accompanying this narrative provided sufficient information to infer that the “tower thing” was a fire lookout tower in nature, allowing this IP to be coded, see [IP Rule 14](#).

viii. Nature

→ Generally, only code IPs that use “nature” as the nature noun if there is not a more specific IP that would encompass the interaction with “nature.”

- a. Example: “**You have the [Named lake]** below you. And if it's a clear day, you can almost see a reflection of the mountain in some parts. It's really cool! But, yeah, and I also like this one, because, it's like...most of the landscape, you know how I was saying about, like views of the city? Most of that stuff is like just **views of nature**. And you really get away from the other city...the lights. The lights can be pretty but, yeah.” → coded as *seeing [Named lake]*

1. Note that “viewing nature” is not coded here because there is another visual interaction pattern that is more specific and that “viewing nature” presumably encompasses: *seeing [Named lake]*

ix. Outside, outdoors

x. Park

→ Code only if the preceding preposition is not “to.” The participant must be interacting *in* or *with* the park or features of the park. The verb must still be an acceptable verb, see [IP Rule 22](#).

→ Do *not* code if the park is specified to be a theme park.

xi. Season(s)

→ Seasons (e.g., spring, summer, fall, winter) can all be coded as nature nouns, as well as the noun “season(s)” itself or any reference to a change in season.

xii. Species

→ Proper species names count as a nature noun in this level of coding.

→ The noun “species” itself can be also count as a nature noun in this level of coding if it is the term the participant used. If additional clarifying information is provided, include it in the IP code according to [IP Rules 3](#) and [5](#).

xiii. Snowball(s)

→ Code as *making snowballs* if the verb is unclear.

xiv. Sunrise, sunset

xv. Sun, moon, stars, or other features of the sky

xvi. Tide(s)

2. List of nouns that cannot be coded as nature nouns in an IP:

i. Day

ii. Direction

iii. Life, living things

iv. Night

→ Night should generally not be coded as a nature noun itself but should be included in interaction patterns as an additional descriptor when applicable, see [IP Rules 3](#) and [4](#).

→ If a participant uses these terms, replace them with one of these three default nature nouns based on the context of the narrative: plant life, animals, or nature.

v. Point

vi. Sidewalk

vii. View

→ View itself cannot typically be coded as a nature noun but may be either transformed into the verb “viewing” if another nature noun is present or used in combination with a particular perspective (e.g., *seeing view from mountainside*). In some cases, that nature noun may be inferred from the participant’s photo, see [IP Rule 14](#).

3. List of human-made artifacts that can be coded as part of an IP:

i. Fort

→ Code only if the fort can be assumed to be in what we define as “nature” or made of natural materials.

ii. Snowman

iii. Window

→ Code only if the participant is interacting with what we define as “nature” through the window (see [IP Rule 19](#)).

iv. Other forms of human-modified nature

→ Code only if the modified nature can be assumed to be in what we define as “nature.”

Level 2 Interaction Pattern Guidelines

Using the level 1 IPs coded from participants’ narratives, more abstract level 2 IPs will be coded. These IPs will serve as the basis for reliability coding and are therefore, in a sense, more important than the level 1 IPs. However, abstract IPs may only be coded when a level 1 IP has already been coded from the narrative. Level 1 IPs are therefore a critical part of this process. As with level 1 IPs, level 2 IPs generally consist of a physical or sensorial verb and a nature noun. Importantly, each unique level 1 IP will always be coded to the same level 2 IP.

Level 2 IP coding will be completed with the aid of a final list of level 2 IPs coded by the research team, from which a reliability coder selects the appropriate level 2 IP for each level 1 IP they have coded. Level 2 IPs could be selected for multiple level 1 IPs given the nested structure of level 1, 2, and 3 IPs. These guidelines are written to guide the *selection* of an appropriate level 2 IP from a level 1 IP, rather than serving as specific rules for *coding* level 2 IPs. However, the guidelines closely mirror the process used by the research team to code and determine the final list of level 2 IPs.

The guidelines presented here reflect the human-nature interactions found in these data. Accordingly, had the data presented us with a different array of human-nature interactions, the guidelines and priorities below would likely be different. Similarly, the prioritization of certain interactions may have changed with different research questions. We welcome a reader to apply

these guidelines to their own data, adapting as needed according to their own research questions and data.

Guideline 1.

The most specific yet closest match to the level 1 IP should be selected from the list of possible level 2 IPs.

Original narrative	Level 1 IP	Level 2 IP	Additional notes
“I would say the ocean cuz then you could keep that with you from when you went and it was something that you felt was very special to you so you think that "oh, I should make a memory of this" - then take a picture of it. ”	<i>photographing ocean</i>	<i>photographing waterscapes</i>	Note that either interaction could likely be coded as “photographing nature” at level 2. However, a more specific level 2 IP can be used to characterize the first example. The second example is assigned a “catchall” level 2 IP representing IPs that could not be coded with more specificity.
“I mean like staying here, um, we go outside a lot and we get to really involved with nature and really experience it. Like we go hiking and, um, just a whole bunch of activities, basically, that revolve, like in nature, like taking pictures , and growing crops and just really interactive.”	<i>photographing nature</i>	<i>photographing unspecified nature</i>	
“The next day, get up, probably do something with the water , whether it be surfing, rafting , something like that.”	<i>rafting on water</i>	<i>rafting on water</i>	Note that either interaction could likely be coded as “rafting on water” at level 2. However, a more specific level 2 IP applies to the second example.
“I think, well kayaking, or not kayaking, ah... whitewater rafting I think was really fun because they have those short, like fast rapids and then you have this time where it's like slow and you're just like peacefully going by and you're just noticing these like beauty...like the beauty in the nature around you cuz you're kind of just going slow and it just naturally comes.”	<i>rafting across rapids</i>	<i>rafting on fast water</i>	

Guideline 2.

Any context surrounding the level 1 IP should be used to determine the most appropriate level 2 IP.

Original narrative	Level 1 IP	Level 2 IP	Notes
<p>“So one great example is composting. So if you use your own plants that you're planting in your garden and you take the green manure and the rest of the plant matter that you're not using to eat and put it back into your compost that's essentially mimicking the cycle of life for what would happen in nature with different plant material or animal material or leaves and such. (unclear few words) It continues that cycle again brings back the nutrients.”</p>	<p><i>composting plant matter</i></p>	<p><i>reusing nature's materials</i></p>	
<p>“No, I just...before I knew [the roses] would hurt me, I kinda just went up and went...grabbed it and just when (demonstrates sniffing deeply) and like, ‘Ow!’”</p>	<p><i>grabbing roses</i></p>	<p><i>encountering plants that can harm</i></p>	<p>Note that the participant shares that they reacted with “Ow!” after <i>grabbing roses</i>, indicating they were hurt in some way when enacting the IP. Rather than coding this as <i>making physical contact with plants</i> for the level 2 IP, the pain the participant experienced indicates this should be coded as <i>encountering plants that can harm</i>.</p>

Guideline 3.

Generally, the nature noun will become less specific at level 2 compared to level 1, whereas the verb will be preserved. Proper nouns will always become more general at level 2

compared to level 1. This is a guideline, not a rule, so there are still many cases in which the nature noun remains the same and the verb changes or both the verb and nature noun change.

Original narrative	Level 1 IP	Level 2 IP	Notes
“Because sometimes you find raspberries or huckleberries and go huckleberry picking.”	<i>finding raspberries</i>	<i>finding berries</i>	
“Just the feel of a breeze has always been one of my favorite feeling in the environment.”	<i>feeling breeze</i>	<i>feeling wind</i>	
So I named it "The End" because this is at that spot at Mt. Rainier. I didn't take any pictures looking down, because, that's just a pretty big height. But just knowing that's a glacier we're looking at and it came down that mountain and we were in a gorge kind of thing of where it melted all the way up to that spot and that's the last little bit of ice on it, you know, where there was so much more than there was and because, you know, things are heating up, ice is going away, it's just slowly going away to become just a boring mountain that gets snowed on at the end of the year and just stuff like this when it was just such a big ice-capped mountain that is slowly going away and will eventually will not have these nice sites and it'll just be a rock.	<i>seeing Mt. Rainier</i>	<i>looking at landscape</i>	Proper nouns, such as “Mt. Rainier” will always become less specific at level 2 compared to level 1.

Guideline 4.

Generally, drop any additional descriptors that do not communicate specific ontogenetic or phylogenetic information not already conveyed by the simplest version of the IP. By ontogenetic or phylogenetic, we mean aspects of a nature interaction that could be considered

important either in the development of the person enacting the IP or have been significant throughout the course of our evolutionary history as a species.

Original narrative	Level 1 IP	Level 2 IP	Additional notes
“I was just laying on the bench, getting drenched by the rain”	<i>laying on bench in rain</i>	<i>experiencing rain</i>	Note that the bench is not included at level 2 as benches are a recent human artifact, not a cornerstone of human-nature interaction patterns in the same way that experiencing rain is.
“Um, so, D and M, they took me out...so earlier, I talked about how I went on a fishing trip about two months after school started, like this is a stressful time, I would say, and, um, we got to go out on the water. And, um, we got there like 6 in the morning and it was this cool river and, um, cuz we were going fishing... ” in reference to a photo of participant holding fish while standing in a boat in the middle of a river	<i>fishing from boat on river</i>	<i>fishing</i>	Note that the boat is not included at level 2 because the action of fishing is considered more phylogenetically important within this interaction pattern. Fishing is related to providing for oneself in nature, so this information is retained at level 2.

Guideline 5.

When an interaction pattern consists of multiple nature nouns, one must make a decision about which nature noun(s) will be preserved when selecting the most appropriate level 2 IP. In many cases, the structure of the IP will guide the selection of the level 2 IP. Most often, the first nature noun can be preserved in favor of the second nature noun. Still, we have developed an order of prioritization specific to these data to guide the selection of one nature noun over another. The following order of priority should generally be adopted for interaction patterns, meaning the following types of information should be prioritized above types of information lower on or missing from the list:

1. Window-mediated interactions
2. Human-human social interactions
3. Meditation
4. Experiences of solitude in nature
5. Photography
6. Seasonal changes (signs of transitions between seasons)
7. Diurnal changes (signs of transitions between day and night, other cycles on a roughly daily rhythm)
8. Close-up details of nature
9. Nighttime nature experiences
10. Signs of nature (weather events, tracks, etc.)
11. Danger, risk, or discomfort
12. Vigorous movement in nature
13. Edges or boundaries in nature
14. Destination spots
15. Established paths
16. Cycle of life
17. Information related to providing for oneself in nature
18. Unexpected encounters
19. Living beings

Original narrative	Level 1 IP	Level 2 IP	Additional notes
“This was the second day when we went out a little bit farther on this one. This one was more or less focused on the...that you could see	<i>seeing sunset over water</i>	<i>experiencing sunset</i>	Note that the “sunset” portion of the IP is prioritized over the view of “water” when determining the appropriate level 2 IP. The sunset

<p>out way far, in the middle of the picture, the islands. It was just saying how big the earth actually is and how crazy the view from here, again, is as you can see the clouds that are kind of like going at like an angle right there. Just like the beauty of the water reflecting it and the island to the right kind of...reflecting. It's really just all about that." In reference to a photo captioned "The Second Sunset"</p>			<p>is an example of a diurnal change, whereas <i>seeing water</i> is merely a visual interaction with a landscape feature.</p> <p>Note also that coding the level 1 IP from this narrative involves a complex combination of IP coding rules, such as IP Rules 13 and 14.</p>
<p>"This is borderline nature but it is outside, it is part of nature so ... What I see here is just a... almost like a pathway of being alone. Like, it's nice to have some alone time to yourself from... When I walk, I walk this path right here. It's often mind-clearing, so it clears my mind, it clears my head."</p>	<p><i>walking alone on path</i></p>	<p><i>walking alone in nature</i></p>	<p>Note that this level 1 IP could reasonably be coded as <i>hiking along established paths</i> or as <i>walking alone in nature</i> at level 2. However, because of the prioritizations described above, the solitude of this IP must be preserved at level 2. This IP is therefore coded as <i>walking alone in nature</i> at level 2.</p>
<p>"The tide pools and looking at the different species around there - we saw different ones and then thinking about how we're all kind of in this together, in this world together."</p>	<p><i>looking at species in tide pools</i></p>	<p><i>seeing aquatic animals</i></p>	<p>Note that this level 1 IP could reasonably be coded as <i>looking into water</i> or as <i>seeing aquatic animals</i>. However, because of the prioritizations described above, the living beings seen in the tide pools must be preserved at level 2 over the landscape feature of tide pools. This IP is therefore coded as <i>seeing aquatic animals</i> at level 2.</p>
<p>"Like as we were rowing and stuff, like, um, when she would speed up, I would speed up and then she'd slow down and I'd slow down and then kind of go, um, a steady pace where we'd stop and let the [kayak] just kind of take us, or like the water, or momentum, I guess."</p>	<p><i>rowing kayak together on water</i></p>	<p><i>recreating in nature with others</i></p>	<p>Note that this could level 1 IP could reasonably be coded as <i>kayaking on water</i> or as <i>recreating in nature with others</i>. Because of the prioritizations described above, the human-human social interaction must be preserved at level 2. This IP is therefore coded as <i>recreating in nature with others</i> at level 2.</p>

Level 3 Interaction Pattern Guidelines

Level 3 IPs can be coded from level 2 IPs in the same way level 2 IPs were coded from level 1 IPs. These IPs can also serve as a basis for reliability coding and are at least as important as level 2 IPs, if not more. Level 3 IPs should only be coded where a level 1 IP and a level 2 IP have already been coded. As before, level 3 IPs generally consist of a physical or sensorial verb and a nature noun. Each unique level 2 IP will always be coded as the same level 3 IP.

Just as with level 2 IPs, level 3 IP coding will be completed with the aid of a final list of level 3 IPs coded by the research team, from which a reliability coder selects the appropriate level 3 IP for each level 2 IP (and its corresponding level 1 IP(s)) they have coded. Rather than present unique guidelines for the selection of level 3 IPs, the same guidelines used for coding level 2 IPs from level 1 IPs can be applied to the process of coding level 3 IPs from the level 2 IPs. Please see the examples of fully coded photovoice narratives for examples of how these guidelines are applied.

Interaction Pattern Coding Beyond Reliability Coding

The next two sections describe additional coding applied to the IPs developed with this study's data that were not part of the reliability coding process for which this coding manual was primarily developed. The inclusion of these additional codes in this technical report is to provide a deeper, more comprehensive understanding of the IPs in relation to this study's focus on adolescent coping and resilience. The "Types of Interaction Patterns" allowed us to narrow the IPs to those most relevant to the aims of the study and the "Nature Needed" coding enables a functional way to highlight the requisite nature making the identified IPs possible.

Types of Interaction Patterns: Linked and Unlinked, Intentional, Indirect, Incidental, and Hypothetical

Not all IPs were handled equally in relation to the primary research questions of this study. Participants highlighted the importance of their nature interactions in various contexts. Through multiple coding rounds, IPs were qualified with additional codes to identify those most relevant to the study's goals and provide additional context for the IP.

The first category of IP qualifier codes was "linked" or "unlinked." IPs that evidenced personal strengths related to coping and resilience were marked as "linked." A "linked" designation indicates a "Strengths" subtheme directly connected to a specific nature interaction within a given narrative. Narratives that resulted in IPs that did not speak to Strengths are considered "unlinked." For instance, a nature interaction described without relevance to identified coping and resilience subthemes would not be marked in the coding spreadsheet as "linked" (i.e., is an unlinked IP). Examples below illustrate both linked and unlinked IPs; portions of narratives used to code Strengths are underlined. Note that the Strengths characterizing Coping and Resilience Domains to which IPs were linked are not described in this coding manual. They are, however, detailed in the lead author's dissertation (Dunker, 2025).

Narrative	IPs	IP Linked	Notes
<p>“Yeah. So I kind of like, naturally...every time I go down to the garden, I go to turn on the water and I pass by like picking raspberries on the side and then that's just like a natural kind of thing. And another thing would be either looking at the herbs, like the mint and kind of like rubbing to see if it smells good and that kind of like one thing I would do.”</p>	<i>picking raspberries</i>	N	<p>IPs identified in the passage are not linked. They are discussed without referencing wellbeing benefits for resilience.</p>
	<i>looking at herbs</i>	N	
	<i>looking at mint</i>	N	
	<i>rubbing plants</i>	N	
	<i>smelling plants</i>	N	
<p>“I think the thing that I like doing the most is when I would clean their pens, like the chicken pen and the duck pen which... because I hate having the dirty pen, and it's like so gross, and I love just putting a new blanket of wood shavings, getting all their eggs, making sure everything is clean and picking up after them. Which I know, like I have to do it and it takes like all the weekends in the summer cuz I'd have to clean the pond but when I'm down there, I like listen to music or just kind of like listen to the nature around me and just kind of zone out just do everything and once it's all done, I feel so good. It feels good to have a clean space and make sure they're well taken care of.</p>	<i>cleaning chicken pens</i>	Y	<p>In this example, all but the last IP are marked as “linked” due to their relevance to this participant’s feeling good about the animals in her care having a clean space to live and having a sense of accomplishment. The listening to nature IP, while presumably enjoyable, was not stated as such and so not linked to coping and resilience domains. The other IPs, however, were “linked” to coping and resilience domains via the good feelings engendered by way of their contributions to the development of a caring relationship with other living beings, taking initiative supporting a sense of purpose, or reinforcing interdependence with nature.</p>
	<i>cleaning duck pens</i>	Y	
	<i>putting wood shavings in pens</i>	Y	
	<i>cleaning duck pond</i>	Y	
	<i>gathering eggs</i>	Y	
	<i>listening to sounds of nature</i>	N	

Importantly, unlinked IPs, while not used for consensus coding on coping and resilience, still contribute to understanding participants' broader nature interactions and are incorporated into participant resilience profiles. More information on the consensus coding process and participant resilience profiles can be found in the lead author's dissertation (Dunker, 2025).

Linked IPs are further categorized as either intentional, incidental, indirect, or hypothetical. Hypothetical IPs often referred to future or desired interactions. However, IPs that were not discussed in the context of a specific experience could be categorized as non-hypothetical (i.e., intentional, incidental, or indirect) if it could be reasonably presumed that the participant had previously engaged in the nature interaction. For example, many participants were asked what they would like to do if they were back in the place in which they took their photo. Participants discussed desires to, for example, walk around, touch certain plants or natural elements, etc. IPs coded from these conversations were often categorized as intentional because the participant was likely to have enacted those interactions at the time at which they took the photo or during other experiences in the same context. This is in contrast to truly hypothetical interactions, such as participants expressing a desire to care for wounded animals in a future career as a veterinarian or a desire to see a species of animal they had never before seen. These hypothetical IPs were not included in the coping and resilience analysis but were considered in participant resilience profiles for a holistic view of their important nature interactions. Only the (linked) nature interactions that were experienced by the participants were considered for the consensus coding process.

The remaining non-hypothetical, linked IPs were coded into one of three types: intentional, incidental, or indirect nature interactions. Drawing from Keniger et al. (2013) and Beery et al. (2017), we refined IPs for deeper context understanding. "Intentional" IPs involve

purposeful engagement with nature such as *swimming in lake*. "Incidental" IPs occur as secondary to other activities, facilitating additional nature interactions such as *falling in powder* as a secondary interaction resulting from the intentional IP of *snowboarding down mountain*. "Indirect" IPs involve interactions near, but not within, outdoor environments such as *seeing moose through a car window*. While most IPs discussed were intentional or incidental, some indirect IPs were also considered significant by participants and included in the analysis.

Nature Needed

To better understand the nature associated with the IPs and the benefits afforded to the adolescents in this study, it is essential to know the specific nature they interact with, especially considering the diversity of nature interactions experienced across participants. Coding the "nature needed" helps us comprehend the range of natural environments and elements that feature prominently in the important nature interactions described in their interviews. By capturing this information, we gain insights into the broad spectrum of nature, from domestic to wild landscapes, that supports the beneficial outcomes of these interactions.

Our coding system unites IPs to descriptive information about the nature needed to better understand each enacted IP. Using the coded IP data, we extract the nature needed by identifying the foundational nature noun needed to enact each IP. In some cases, additional descriptors are added to articulate the nature needed to afford the specific coded IPs (see the examples in the table below). This data is then entered into our spreadsheets alongside the IPs and illustrated in the examples below. Only the nature directly associated with a specific level 1 IP is linked.

Quotes	Level 1 IP	Nature Needed
<p>“Um, <i>being with like the plants and animals</i>. So you can, uh, you can just leave whenever you want, but, it's not like you're alone cuz there's like always something there that can keep you company, even if it's only like a one-way conversation.”</p>	<p><i>being alone with nature</i></p>	<p>uncrowded nature</p>
<p>“I can see. Cuz I'm often looking up at the tree. If I could <i>climb up to the top of the tree</i>, I can look down and see a different point of view which, you know, being taller...sometimes being below a tree can be very overwhelming because it's just peering over you but, you know, if you're in it, you can hug it, and you can feel it. It's like you just, you're together, like you're a branch. It's like a "self" branch.”</p>	<p><i>climbing to top of tree</i></p>	<p>climbable trees</p>
<p>“I think here at [the group home] we're fortunate for having that hill, because if we need to get away from people, are stressed or something, um, just <i>hiking up that hill</i> - especially when you have a beautiful sunset, it's like you look over and every time, I'm like surprised like "Dang! This is so pretty!”</p>	<p><i>hiking up hill for view</i></p>	<p>hikeable land</p>
		<p>hill</p>
		<p>viewscape</p>

By coding the nature needed, we can query the database to pull up all IPs of a certain type and understand the diverse nature descriptions associated with that IP across participants. For example, an IP of *sitting in nature* may involve various nature features such as under a willow tree, on rocks, by a rushing river, on a beach, or in the grass. This understanding becomes particularly helpful when considering contexts like, for example, rest and relaxation, such as de-stressing, meditating, or wildlife watching.

Alternatively, we can query specific forms of nature to see the diversity of associated IPs and their relative importance for the participants. For example, a sampling of the IPs in these data associated with a river include: *hearing running water, listening to rushing river in late spring, walking by river, sitting by rushing river, photographing river, seeing colors of river, watching river, sitting in river with fish, camping by river, swimming in river, rafting on moving water, riverboarding through rapids, sitting in boat on river, flyfishing for trout, seeing river otters, crossing rivers, hammocking over water*, among others. Such information may prove helpful in considering possibilities for nature engagement for those in close proximity to a river or, perhaps, planning for a river outing.

Taking this a step further, we can also query the benefits for coping and resilience linked to IPs associated with rivers. While not described in this coding manual, an additional coding process employed with this study's data applied our IP analysis to the understanding of adolescent coping and resilience literature (see Dunker, 2025). The findings allowed us to develop an understanding of the nature interactions supporting "Strengths" (subthemes) reflecting "Coping and Resilience Domains" (themes) associated with adolescent resilience. Linking the nature needed to the relevant IPs provides a more detailed understanding of the types of nature allowing for these important forms of nature engagement.

Examples of Fully Coded Photovoice Narratives

The examples below were selected for their range of interaction patterns and the coding rules employed to arrive at these interaction patterns. The L1, L2, and L3 IPs derived from these narratives are shared, along with the classification of the type of IP, and the Coping and Resilience Domain supported by the Strength “linked” directly with the IP. The interaction types are coded as intentional (T), incidental (C), indirect (D), or hypothetical (H) according to the guidelines described above. For further information on how coping and resilience strengths were coded and what they represent, please see (Dunker, 2025).

Participant’s Photovoice: “Change in season”



(Photograph by an anonymized participant. Copyright 2025. Used with Permission.)

	Time	Data	L1	L2	L3	Type	Strength	C&R Domain
P	1:23:46	So this was when it was before that first snow. No...actually, no, it wasn't this time. It was like that first time, and we were, like, "What?! It's snowing?" And it was, like, quite a bit and, um, I saw this and I thought it was like...it kind of looks like this photo could've been Photoshopped almost cuz it's like a perfect row of snow and then there's just like...just a patch of leaves. And I thought it was interesting to like take a picture like, wow, this really does kind of represent the differences in the seasons. And I feel like you kind of like...when you look at them so closely together, you're like wow, those are such different seasons and that just like happened in like a day. Like it can go from this fall to snow the next day.	<i>Seeing snow</i>	<i>Looking at snow</i>	<i>Viewing snowscape</i>	T	Aesthetic appreciation	Transcendence
			<i>Photographing landscape</i>	<i>Photographing landscapes</i>	<i>Archiving nature memories</i>	T	Aesthetic appreciation	Transcendence
			<i>Seeing leaves</i>	<i>Seeing leaves</i>	<i>Seeing plant life</i>	T	Aesthetic appreciation	Transcendence
			<i>Experiencing seasons</i>	<i>Experiencing changing seasons</i>	<i>Experiencing periodicity of nature</i>	T	Curiosity and wonder	Transcendence
C	1:24:39	Yeah. So in your experience then, of nature, why or how, I guess, or what do you value in the change of seasons?						
P	1:24:54	Um, I think it's, um, important to notice the differences in like leaves or in the ground, um, or just even plants, like, in the change of seasons. Cuz like in the spring, that's when all the flowers come out. But in the summer, that's when, like more of the	<i>Noticing differences in leaves in change of seasons</i>	<i>Experiencing changing seasons</i>	<i>Experiencing periodicity of nature</i>	T	Aesthetic appreciation	Transcendence

	<p>greenery comes out, more things become ripe. And then fall, it's like things are kind of like winterizing but then there's still beauty in that, too. Um, and I just think that this was a really good representation of how nature, like, changes, like in the seasons. But I mean, obviously, this is how you know that climate change is kind of real because it was so early in the season that, um, like it was trying to cool down and it just got too cold and things didn't get time to winterize, which caused a lot of tree branches to fall and a lot of damage. Which is also like another thing which is like, this is why we need to take care of our earth because, like, we want photos like this - to still be beautiful. But it can't happen if we continue to treat the earth like trash and it's just gonna be really sad to see that happen if it does.</p>	<p><i>Noticing differences in plants in change of seasons</i></p>	<p><i>Experiencing changing seasons</i></p>	<p><i>Experiencing periodicity of nature</i></p>	T	<p>Aesthetic appreciation</p>	<p>Transcendence</p>
						<p>Insight and wisdom</p>	<p>Critical thinking</p>
		<p><i>Noticing differences in ground in change of seasons</i></p>	<p><i>Experiencing changing seasons</i></p>	<p><i>Experiencing periodicity of nature</i></p>	T	<p>Aesthetic appreciation</p>	<p>Transcendence</p>
						<p>Insight and wisdom</p>	<p>Critical thinking</p>
		<p><i>Seeing flowers come out in summer</i></p>	<p><i>Experiencing summer</i></p>	<p><i>Experiencing periodicity of nature</i></p>	T	<p>Aesthetic appreciation</p>	<p>Transcendence</p>
		<p><i>Seeing greenery come out in summer</i></p>	<p><i>Experiencing summer</i></p>	<p><i>Experiencing periodicity of nature</i></p>	T	<p>Aesthetic appreciation</p>	<p>Transcendence</p>

			<i>Seeing produce ripen in summer</i>	<i>Experiencing summer</i>	<i>Experiencing periodicity of nature</i>	T	Aesthetic appreciation	Transcendence
C	1:26:42	And very striking the difference between the two. I had to look at this picture for a long time cuz I wasn't sure what I was seeing. It didn't look right because here you have the green grass and the leaves and then, on the back, it's like, "Is that some weird reflection on the ground?" that it looked all...you couldn't see the leaves and grass anymore. And it's like, "uh-oh, I'll be dipped, it's snow!"						
P	1:27:07	Yeah.						
C	1:27:09	It's a really interesting picture. So do you find yourself wanting different things in your experience outdoors in different seasons? Do you find yourself wanting to...well that's not quite the right way to word it... When you think about what you do in the outdoors and what you get out of it, are there different things that you get from those experiences in different seasons or is it kind of the same no matter what? I don't know if I'm making very good sense...						
P	1:27:47	No, I get what you're trying to say. I feel like when the seasons change, overall it's sort of the same experience. Like obviously it's different in the sense that it's a different season and you're doing different activities, but I think overall, what nature kind of						

		brings to me is like you're experiencing the outdoors. There's some level of like challenge and then you kind of like work through that and then you have time to relax, notice the beauty in nature and then experience that with everybody else, too.						
C	1:28: 30	Gotcha. Yeah. Nice! And, lo and behold, that brings us to the end of the pictures. Let me just double check on...I brought a copy of your journal prompts and I can't remember if I had any questions for you or not. I think you answered your questions pretty thoroughly. Cool! So anything else that I should maybe know about what you value in nature or what you find most important about how you enjoy or experience nature?						
P	1:29: 21	Um, I think the biggest thing is just don't like lose track of finding detail in parts of nature that you wouldn't think are beautiful. Like that's one of my biggest things. Like, ah, I think in the past year that's I've improved on. Normally I would just go through, like, a normal hike and I would just like not really look at anything and think, "oh, it's just a tree." "oh, it's just a flower." But when you really like just look at the detail and like... And you can kind of relate that to like life experiences and it just kind of gives you a good sense of how nature and you are actually pretty similar. Like in a way.						
C	1:30: 19	That's impressive that you have that kind of insight at your age that you're recognizing that. Usually that's a kind of wisdom that comes later on but you're already						

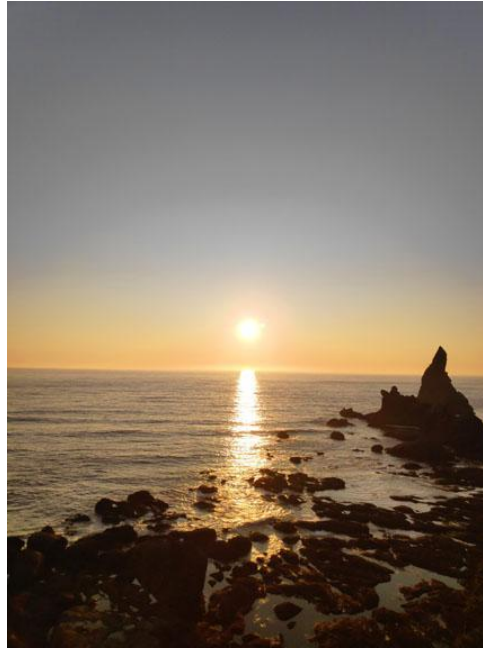
		seeing that and relating that to what's around you. That's really...I find that very encouraging that you already have that kind of thought and that awareness.						
P	1:30: 41	Yeah. Well, I think the biggest thing...kind of why I got into nature, um, was, like I didn't want to be like every other teenager. Like I don't want to look at the world like, "oh, it's about video games." "Oh, it's school" and like, "oh, everything sucks!" Like, I...I don't think I've ever felt that way but I think it's also helpful that I kind of had experiences in my past where it wasn't easy and we were just like...just getting by. And I think that's a different thing then...even just money. Like we didn't have a lot of money but we also didn't use what we had, like our land, like even just our back yard, like we could've had a garden... And honestly, that's something that I kind of like look back at and, I'm like, that would've made life a lot easier is having all that - and now that I have that now, I don't want to take advantage of that, even though I have all my needs met and I don't technically need to have a garden, to have nature, but, just like looking at my past experience, I'm like, I would have wanted something like that in my past, that I shouldn't take advantage of it now that I have, like, money and all that. And it means so much more than just having money and having your needs taken care of. It's like...honestly, I think I would rather be poor and have everything that I need in my backyard than be rich and just never know what to do with any of my money.						

C	1:32:32	<p>And that's beautiful. I wish more people - adults and kids - would have that sense. There's much to be appreciative of just having basics and you are already proving to be very self-reliant and independent and a problem-solver - that you just get things done. But it also sounds like you know how to relax and to enjoy, and give yourself permission to take time to look around and notice things. That's really cool, I like that!</p>					
P	1:33:17	<p>And I think another thing is, uh, a lot of kids just think like, "oh, adults are here to like make us live in hell" and like all that. And I'm like, "Well, have you ever tried to listening to any of their advice? Listening to any of them? Like even just listening, not even necessarily doing, but just kind of like listening and considering the things that they say?" Cuz for the most part, adults, I mean they go through...they've lived life long enough to know that...like they know things, and they have things that they regret, and they're just like, "Don't make the same mistake!" And then, if you make the same mistake, it's like "Did you really listen to me? Or did you just, like, hear what said and then just didn't even consider it?"</p>					
C	1:34:09	<p>I've done that many times myself. I'd like to think that in some ways I've matured enough that I'm going to take other people's advice, but sometimes it's hard to do and I still find myself not listening as much as I should. Which you're already getting a leg up on cuz I know I was rebellious when I was younger and did</p>					

		not take the advice that I should have. And, you know, sometimes you just have to learn lessons the hard way before they sink in. You sound very mature and wise beyond, I think, many other people your age. And you've already figured a lot of that out, so kudos for you! That's going to take you far. And I want to come out and see you with your chickens!						
P	1:35:04	Yeah, I'm gonna graduate to the coffee roasting. Should be nice.						
C	1:35:09	Really?						
P	1:35:10	Yeah.						
C	1:35:11	When's that going to start?						
P	1:35:12	Well they applied for a grant and are just waiting on that. Should get it mid-December. And if they don't get that, we're gonna... we have other plans but we're going to try and get the grant and I think they're gonna put in a loan or something.						
C	1:35:30	Wow! I have never done that. It sounds really interesting.						

P	1:35:35	Yeah, so we pretty much all we'll need...we already have an espresso machine, we just need to get the coffee roaster. And we're going to make it a business. So we'll be getting paid part time. P and I are gonna take over that.						
C	1:35:58	Wow!						
P	1:36:06	Yeah, it's something that we've always thought of introducing into the whole permaculture, agriculture, all that, but um, it kind of just never went into play until we had two people who would be really committed.						
C	1:36:26	Cool! So what kind of training do you need?						
P	1:36:29	So D actually roasts coffee, so he'll give us some pointers and we'll take some classes online or something.						
C	1:36:44	Cool! Well, if you need any guinea pigs to help sample, let me know, I'm all in for that! Well this has been a very fun conversation. Thank you.						

Participant's Photovoice: "Sunset on a Beach"



(Photograph by an anonymized participant. Copyright 2025. Used with Permission.)

	Time	Data	L1	L2	L3	Type	Strength	C&R Domain
P	41:36	This was along a beach, along the Pacific coast. And I was here with a couple of my friends. We spent a two-day trip - just kind of exploring and having fun. And this was kind of late at night with obviously	<i>Seeing tide pools on rock</i>	<i>Looking at water</i>	<i>Viewing waterscape</i>	T	Aesthetic appreciation	Transcendence

		<p>there's a sunset and this is along a coral reef or coral...I'm try to remember the name for this...it's like a...tide pools. So those were on the tide pools up on a rock and kind of sat there for a while and listened to the waves, watched some of the seals that were around, some of the birds in the sky. There was no one besides my group who was away but there was no other humans, there was no other boats going around, no planes. It was really minimal interaction with humans which is nice. Which is beautiful, too. Thinking about how that things are out of your control, in a sense, and that the ocean is out of your control, the sun is out of your control. The tide pools and looking at the different species around there - we saw different ones and then thinking about how we're all kind of in this together, in this world together. And that there are these primordial, primal things like the ocean and the sun. Whatever you believe in, that those are there that you can't change. It's kind of thinking about perspective and the scope of things.</p>	<i>Exploring ocean beach</i>	<i>Exploring nature</i>	<i>Exploring nature</i>	T	Awe	Transcendence
			<i>Seeing sunset</i>	<i>Experiencing sunset</i>	<i>Experiencing periodicity of nature</i>	T	Awe	Transcendence
			<i>Listening to waves</i>	<i>Hearing sounds of water</i>	<i>Listening to nature</i>	T	Awe	Transcendence
			<i>Watching seals</i>	<i>Seeing aquatic animals</i>	<i>Seeing wildlife</i>	T	Awe	Transcendence
			<i>Watching birds in sky</i>	<i>Seeing birds</i>	<i>Seeing wildlife</i>	T	Awe	Transcendence
			<i>Looking at species in tide pools</i>	<i>Seeing aquatic animals</i>	<i>Seeing wildlife</i>	T	Awe	Transcendence
C	43:17	That's powerful.						

P	43:23	I do this in nature a lot, I guess, when I'm just out and about in the forest, whether I'm hiking, fishing, swimming, I think about nature and you give up the things you can't control, things that are out of your control - there's a lot of them.	<i>Hiking in forest</i>	<i>Hiking in nature</i>	<i>Traversing through nature</i>	T	Self-awareness	Autonomy
			<i>Fishing in water</i>	<i>Fishing</i>	<i>Seeking and catching animals to eat</i>	T	Self-awareness	Autonomy
			<i>Swimming in nature</i>	<i>Swimming in nature</i>	<i>Moving vigorously through water</i>	T	Self-awareness	Autonomy
C	43:42	Do you get the same kinds of outcomes depending on the type of nature that you're in? I mean, does the type of nature make a difference for you when you're talking about what this represents?						
P	44:06	A little bit. I mean there's usually more deep thoughts and a little more involvement when there's more diversity. That's just how your brain works, it's just the more inputs, the more outputs. But usually it's pretty similar just perennial things and then it also depends on, kind of the time of day, as well. This right here, it's kind of, it's at the end of the day where it was a long day of hiking and playing around in the hot sun so I was kind of tired a little bit and probably a little dehydrated (smiles).	<i>Hiking in nature</i>	<i>Hiking in nature</i>	<i>Traversing through nature</i>	T		
			<i>Playing in nature</i>	<i>Playing in and with nature's materials</i>	<i>Playfully engaging with nature</i>	T		
C	44:50	(laughing) So much water and yet so dehydrated...						
P	44:52	Yes!						

C	44:58	And it would be certainly difficult. You said you were out and away from people and, you know, this broad expanse of ocean and land and...						
P	45:07	It was pretty, the tide pools...						
C	45:11	...and the tide pools, and so definitely a more wild and scenic type of a landscape - very expansive!						
P	45:18	Yep.						
C	45:20	That would be hard to replicate that, I imagine, the shores of the [local river] - smack dab in the middle of [city of group home]!						
P	45:28	Or California!						

Nested Structure of Level 1 IPs Within Level 2 IPs Within Level 3 IPs

Following is the full set of discrete Level 1 IPs coded in the lead author’s dissertation (Dunker, 2025), presented in their nested structure within Level 2 and Level 3 IPs. These detailed IPs illustrate potential applications for other studies and purposes (e.g., nature-based interventions, environmental education, landscape design considerations). They can also serve as a generative framework for exploring physical and sensorial engagement with nature across diverse contexts.

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)			
Archiving nature memories	Collecting nature features	Collecting rocks			
	Memorizing landscape	Memorizing landscape			
	Photographing animals	Photographing animals	Photographing animals		
			Photographing bees		
			Photographing bird		
			Photographing birds		
			Photographing chicken flying		
			Photographing eagle		
			Photographing kittens		
			Photographing shells		
			Photographing wolves		
			Photographing landscapes	Photographing landscapes	Photographing campsite in nature
					Photographing city from hillside
					Photographing landscape
					Photographing mountains
	Photographing plants	Photographing plants	Photographing empty trees with no leaves		
			Photographing flower		
			Photographing flower with rain drops		
			Photographing flowers		
			Photographing herbs		
Photographing leaves					
Photographing mushroom					
Photographing seaweed					
Photographing tiny pine trees					
Photographing trees					
Photographing skiescapes			Photographing skiescapes	Photographing clouds	
	Photographing sun				
	Photographing sunset				
Photographing unspecified nature	Photographing unspecified nature	Photographing nature			
		Photographing nature from mountaintop			
		Photographing nature through close-ups			

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Photographing waterscapes	Photographing moonlight on water Photographing ocean Photographing rain Photographing river Photographing water
Ascending nature	Climbing hill Climbing lookout tower Climbing mountain Climbing steep incline Climbing tree Climbing tree or other plant form Jumping up on nature Rock climbing	Climbing hill Climbing up lookout tower Climbing mountain Climbing mountains Climbing on mountainsides Climbing to top of mountain Climbing up mountain Climbing rocks Climbing up cliffs Climbing up ledge Climbing on trees Climbing to top of tree Climbing tree Climbing trees Climbing trees in forest Climbing on top of grasses Climbing up on logs Jumping up on grass Climbing on rocks
Avoiding nature features	Avoiding falling into waterfall	Avoiding falling into waterfall
Building with nature's materials	Building with nature's materials for permanent use	Building garden Building pond Making trail
Caretaking for animals	Caring for pets	Caring for bird Caring for birds Caring for cat Caring for cats Caring for chickens Caring for dog Caring for dogs Caring for ducks Caring for pets Working in chicken pens

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Caring for sick or injured animals	Caring for sick or injured animal Checking up on sick or injured animal Keeping sick or injured animal Killing dying insects Releasing sick or injured animal Treating sick or injured animal Wrapping up sick or injured animal
	Cleaning and maintaining animal homes	Cleaning chicken pens Cleaning duck pens Cleaning duck pond Cleaning pens for chickens Putting wood shavings in pens
	Feeding and watering animals	Feeding chickens Watering chickens
	Raising animals	Raising chickens Raising dog Raising ducks
Cleaning up in nature	Cleaning up in nature	Cleaning up nature Cleaning up trash in nature Picking up trash
Eating in nature	Eating in nature	Eating lunch on boat on river Eating under willow tree Picnicking in nature
Eating or drinking food that was foraged, harvested, raised, captured in nature	Drinking foraged tea	Drinking foraged tea Drinking tea from foraged materials Drinking tea made from foraged materials Eating fish Eating heart of cutthroat trout Swallowing heart of cutthroat trout Eating food from garden Eating healthy food from garden Eating collected edibles Eating dinner of wild edibles
Encountering animals unexpectedly	Encountering animals unexpectedly	Coming across animals Stepping on anemone

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)		
Encountering nature that can harm	Encountering animals that can harm	Being bitten by ducks		
	Encountering harm from plants	Being stung by insects		
	Encountering plants that can harm	Being poked by tree		
		Being itched by grasses		
		Being poked by roses		
		Being scratched by roses		
		Being scratched on ankle by rose		
Encountering obstacles in nature	Clambering over nature features	Bouldering on rocks		
		Climbing on rocks		
		Climbing over boulders		
		Climbing rocks		
		Climbing up rocks		
		Crawling across rocks		
		Crawling on logs		
		Crossing boulders on beach		
		Getting over rocks		
		Stepping over logs		
	Falling in nature	Falling from tree		
		Falling in powder		
		Falling on snow		
		Falling onto tree		
		Tripping onto rock		
		Engaging with nature's cycle of life and death	Cutting and replanting trees	Cutting down tree
				Planting replacement tree
Observing cycle of death and regrowth of trees	Identifying processes of seasonal growth and death			
	Seeing baby pine tree			
	Seeing trees die			
Reusing nature's materials	Watching trees grow			
	Composting plant materials			
Seeing dead animals	Reusing tree for firewood			
	Seeing dead crab			
	Seeing dead deer			
Evaluating risk in nature	Assessing risk in nature	Eyeballing depth of water		
		Gauging ocean tides		
		Watching out for tides		

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Avoiding nature features	Ducking under trees
	Experiencing risk in nature	Biking down steep hills
		Crossing beach with tides
		Crossing rivers
		Driving off cliff into river
		Re-climbing tree
		Walking into tree
	Jumping down from high point	Jumping off cliff into water
		Jumping off cliffs
		Jumping off rocks
		Jumping over ledge into water
Experiencing nature at night	Listening to nature at night	Hearing animals at night
		Hearing birds at night
		Hearing coyotes at night
		Hearing owl
		Hearing owls
		Hearing owls at night
		Listening to coyotes at night
		Listening to nocturnal nature
		Listening to owls at night
		Noticing sounds in nature at night
	Looking at night sky	Experiencing darkness of night
		Looking at stars
		Observing constellations
		Observing moon
		Seeing full moon
		Seeing stars
		Seeing stars come out
	Recreating at night	Skiing at night on snow
		Snowboarding at night on snow
	Seeing animals at night	Seeing animals at night
		Seeing deer at night
	Sitting in nature at night	Sitting on top of mountain during full moon
	Traversing through nature at night	Hiking at night
		Hiking on trail on top of mountain during full moon
		Walking in forest at night
		Walking in nature at night

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Viewing landscapes or waterscapes at night	Walking in nature in dark Walking on trails at night Looking out from hillside at night Looking out from hilltop at night Seeing moonlight reflected on water
Experiencing nature through scent	Smelling nature	Smelling berries Smelling Christmas trees Smelling dry meadow Smelling flower Smelling flowers Smelling forest Smelling ocean Smelling pine tree in rain Smelling plants Smelling rain Smelling raspberries Smelling roses Smelling seaweed Smelling tree sap Smelling trees
Experiencing nature through taste	Drinking water from natural sources Tasting plants	Drinking water from waterfall Tasting geyser water Tasting berries
Experiencing nature through touch	Feeling textures in nature Making physical contact with plants	Feeling berry leaves Feeling pokey bush Feeling roughness of trees Feeling softness of leaves Feeling softness of trees Feeling textures of grasses Getting sand in shoes Touching shell slime Breaking off Douglas fir branch tips Feeling grasses Feeling way around garden Rubbing plants Touching pine needles

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Touching waterfalls	Touching trees Touching waterfalls
Experiencing nature through window	Experiencing nature through window	Feeling warmth of sun through window Photographing mountain through car window Seeing black bear through car window Seeing different animals through car window Seeing moose through car window Seeing mountain through car window Seeing sun shining through window
Experiencing nature with others	Eating in nature with others Gathering around campfire Recreating in nature with others	Picnicking in forest with others Being warmed by campfire Gathering around campfire Sitting around campfire Sitting by campfire Biking with others on trail Building with snowmen with friends Camping with family in nature Catching leaves with friends Climbing up steep parts of mountain with others Exploring forest with family Hiking [named] trail with cottage family Hiking in nature with one other person Hiking up trail to destination point with friend Kayaking on ocean with others Kayaking together on ocean Making snow angels with others Planting morning glories with grandma Playing outside with kitten and other people Playing with friends in leaves Rowing kayak together on water Sitting at top of mountain with others Sitting with others under willow tree Skiing down mountain with group Skiing on snow with friends Throwing leaves with friends walking in nature with others Walking through forest with others

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)	
Experiencing periodicity of nature	Experiencing autumn	Walking with others on trail	
		Seeing changing color of leaves	
			Seeing fallen leaves
			Seeing falling leaves
			Seeing leaves falling from tree
			Seeing leaves in fall
			Seeing trees change colors and lose leaves
			Seeing trees in autumn
			Seeing trees with no leaves
			Seeing trees without leaves
		Experiencing changing seasons	Experiencing seasons
			Noticing change in seasons
			Noticing changes in trees
			Noticing differences in ground in change of seasons
			Noticing differences in leaves in change of seasons
			Noticing differences in plants in change of seasons
			Seeing changes in the seasons
		Experiencing spring	Seeing flowers bloom in spring
			Seeing garden bloom
			Seeing plants start to bloom
		Seeing trees bloom in spring	
	Experiencing summer	Seeing flowers come out in spring	
		Seeing greenery come out in summer	
		Seeing produce ripen in summer	
		Seeing sun in summer	
	Experiencing sunrise	Noticing changing colors in sky	
		Seeing sunrise	
		Watching sunrise	
	Experiencing sunset	Looking at orange clouds	
		Looking at orange sun	
		Seeing colors change in night sky	
		Seeing colors in sky	
		Seeing colors in sky during sunset	
		Seeing colors of sunset in sky	
		Seeing darkness after sunset	
		Seeing sunset	

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Seeing sunset from hillside Seeing sunset over mountain Seeing sunset over mountains Seeing sunset over ocean Seeing sunset over water Seeing sunsets Viewing sunset Walking in nature at sunset Watching sun go down Watching sunset Being pushed by tide into ocean Feeling waves crash over body Noticing tides Seeing tides roll in Watching tides roll back
	Experiencing tidal changes	
Experiencing solitude in nature	Being alone with nature Running alone in nature Sitting or laying alone in nature Walking alone in nature	Being alone with nature Running solo in nature Laying under willow tree by oneself Sitting alone on grass Sitting alone under willow tree Walking alone on path Walking alone on trail
Experiencing the elements	Breathing air Experiencing rain Experiencing storms	Breathing clean air Breathing fresh air Being rained upon Feeling cold rain on warm face Feeling rain on face Getting drenched by rain Getting wet in rain Laying down in rain Laying on bench in rain Seeing rain Walking in rain Hearing thunderstorms Listening to thunderstorms Seeing red and white streaks of lightning Standing in thunderstorms Viewing red sun after snowstorm

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Walking during thunderstorm
		Walking in nature during thunderstorm
	Experiencing the elements	Being misted by waterfall
		Seeing fog
		Seeing weather patterns
	Feeling humidity	Standing in snowfall
		Feeling high humidity
	Feeling rain	Feeling low humidity
	Feeling temperatures	Feeling cold from rain
		Feeling cold water
		Feeling temperature of water
		Touching cold water
	Feeling wind	Feeling air
		Feeling breeze
		Feeling breezes
		Feeling cold wind
		Feeling cool air on nose and cheeks
		Feeling wind
		Feeling wind on face
Exploring nature	Exploring nature	Discovering plum orchard
		Exploring forest
		Exploring nature
		Exploring ocean beach
		Exploring trees on mountain
		Finding special place in garden
Finding rest and relaxation	Laying down in, on, or under nature	Laying down in meadow
		Laying down in rose bushes
		Laying down on grass
		Laying in snow
		Laying on beach
		Laying on grass
		Laying on pile of leaves
		Laying under tree
	Meditating in nature	Meditating on beach
		Meditating on grass
		Meditating on mountain
		Meditating to sounds of slow-moving river
		Meditating while walking on trails at night
	Sitting down in, on, or under nature	Sitting by cherry blossom tree

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Sitting by river Sitting by rushing river Sitting down on beach Sitting in grass Sitting on beach Sitting on bench on mountain Sitting on ground Sitting on rocks Sitting outside Sitting under willow tree Hammocking over water Napping in grasses Napping in meadow Napping on grasses Sleeping by rushing river Sleeping in grasses Sleeping on grass Sleeping to sound of waterfall
Foraging or harvesting edibles to eat or drink	Finding berries	Finding huckleberries
	Foraging berries	Finding raspberries Foraging berries Foraging blackberries Foraging huckleberries Foraging salmonberries Gathering huckleberries Gathering wild berries Picking huckleberries
	Foraging edibles to eat or drink	Foraging for food Foraging for wild edibles Foraging for wild edibles to make tea Gathering plants for tea
	Foraging non-berry plants	Foraging cattails Foraging for herbs Foraging St. John's Wort
	Gathering eggs	Gathering eggs
	Harvesting food from garden	Harvesting food Harvesting plants Harvesting produce from garden

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Picking berries	Harvesting raspberries Gathering berries Grabbing raspberries Picking raspberries
Foraging plants for mental health	Foraging herbs for medicinals	Foraging St. John's Wort
Gardening	Caring for garden plants	Caring for garden Checking strawberry plants Inspecting garden plants
	Caring for lawn	Cleaning lawn Raking leaves
	Caring for trees	Caring for trees
	Growing flowers	Growing red roses
	Growing food	Growing crops Growing food Growing food in garden Growing herbs Growing vegetables in garden
	Planting plants	Planting branches Planting dead strawberry Planting flowers Planting garden Planting grapes Planting petunias Planting plants Planting rhubarb Planting seeds Planting squash Planting strawberries Planting tree Planting trees Replanting hydrangeas
	Preparing garden	Covering soil Ripping out grassland
	Protecting garden plants	Fencing in strawberry plants Protecting plants from running kids Protecting trees Protecting trees from harmful bugs Putting up fence around garden

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Pruning trees	Pruning plum trees
		Trimming trees
	Watering plants	Watering garden
		Watering plants
		Watering trees
	Weeding plants	Weeding garden
		Weeding plants
	Working in garden	Shoveling dirt
		Working in garden
		Working with garden
		Working with nature through permaculture
Grounding oneself within earth and sky	Touching ground	Touching earth
	Touching sky	Touching sky
	Touching sky and earth together	Touching sky and earth simultaneously
Hiking to destination spot	Backpacking in nature	Backpacking in nature
	Hiking to destination spot	Backpacking on peninsula
		Hiking to frozen pond
		Hiking up hill for view
		Hiking up mountain for view
		Hiking up mountain to viewpoint
		Hiking up to waterfall
Immersing one's body in water	Dipping part of body in water	Being in salty ocean water
		Dipping hands in water
		Dipping toes in ocean
		Putting feet in water
		Wading in water
	Feeling waves	Being knocked over by wave
		Feeling waves crashing on oneself
		Getting splashed by waves
	Holding breath in water	Holding breath in water
	Jumping into water	Dunking in lake
	Jumping in lake	
	Jumping into water at waterfall base	
	Plunging into freezing water	
Listening to animals	Hearing animals	Hearing animal sounds
		Hearing birds
		Hearing birds from distance

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Hearing dog bark
		Hearing seagulls
		Hearing sounds of animals
	Listening for animals	Listening for animals
	Listening to animals	Listening to birds
Listening to nature	Experiencing quiet in nature	Experiencing quiet in nature
	Hearing other sounds of nature	Hearing crunch of rocks under feet
		Hearing leaves crackle
		Hearing sounds in nature
		Listening to nature
		Listening to nature sounds
	Hearing sounds of water	Listening to sounds of nature
		Hearing different sounds of waterfall
		Hearing sound of waterfalls
		Hearing water flowing
		Hearing waterfall
		Hearing waves
		Listening for running water
		Listening to rushing river in late spring
		Listening to waterfall
		Listening to waves
	Hearing sounds of weather	Hearing flag flapping in wind
		Hearing wind
		Listening to rain
Looking closely at details of nature	Drawing in nature	Drawing beach sunsets
		Drawing flowers
		Drawing nature
		Drawing sunsets
	Looking closely at details of nature	Finding swirls in nature
		Looking at bright flowers
		Looking at design in flower
		Looking at details in leaves
		Looking at flower growth
		Looking at mushroom with microscope
		Looking at texture in flower
		Looking closely at seaweed
		Noticing details in leaves
		Noticing feather patterns

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Observing bold colors in flowers Observing fading colors in flowers Pointing out bird feet Seeing assorted colors of flowers Seeing brown colors of tree Seeing color of leaves Seeing colors of leaves Seeing contrasting colors of bark on birch tree Seeing details in feathers Seeing pink flower up close Seeing rain drops on tree seeing raindrops on leaves Seeing raindrops on pine needles Seeing shades of colors Seeing textures of tree Seeing uniqueness of sea shells Seeing veins on leaves
Looking for animals	Looking for animal artifacts Looking for animals	Looking for shells Lifting up log Looking for animals under snow Looking for aquatic animals Looking for gophers under snow Looking for marine animals Looking for orcas Looking for sand dollars Looking for whale Looking for wild hamsters under snow Looking for insects
Moving across fast-moving water with aid of vessel	Looking for insects Boogey- or body-boarding on water Rafting on fast water Riverboarding on water Surfing on water	Body-boarding on waves Rafting across rapids Rafting on moving water Riverboarding on [Named] River Riverboarding through rapids Flowing with ocean waves Going against ocean waves Surfing on ocean Surfing on waves

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Tubing on water	Gliding on waves behind boat Tubing on water behind boat
Moving along edges of nature	Hiking edges of nature Scootering by river Swimming along boundary of water Walking edges of nature	Backpacking along ocean beach Climbing up edge between mountain and glacier Hiking along beach in forest Hiking along beach in urban area Hiking along ocean beach Hiking along rocky ledge Standing on edge of mountain Scootering next to river Swimming in boundary between freshwater and seawater Strolling along beach Walking along beach Walking by river Walking by roses Walking on beach Walking perimeter of garden
Moving along established paths	Hiking along established paths Walking along established paths	Exploring forest trails Hiking on narrow trail in forest Hiking on trails Hiking up mountain trail Hiking up road Hiking urban trails Exploring paths in nature Walking along curvy trails Walking down tree-lined lane Walking on HOME trail Walking on trail Walking trails Walking trails in mountains Walking trails in nature
Moving on water with aid of vessel	Boating on body of water Kayaking on water	Crossing water on ferry Sitting in boat on river Kayaking on ocean Kayaking on water

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Rafting on water	Paddling kayak on water Rafting down river Rafting on river Rafting on slow water Rafting on water
Moving one's body vigorously in nature	Exercising in nature Running in nature	Exercising in garden Running down mountain Running in nature Running up hill Running up trail Running uphill
Moving vigorously on or in snow	Moving whole body in snow Sledding or tubing on snow or ice Snowboarding on snow Snowshoeing on snow	Moving body in snow Sledding on snow Tubing downhill on ice Snowboarding at [named ski mountain] Snowboarding down mountain Snowboarding on snow Snowboarding quickly across snow Snowshoeing among trees Snowshoeing on local mountain Snowshoeing on snow
Moving vigorously through water	Boogey- or body-boarding on water Jumping through water Swimming in nature	Boogey-boarding on ocean Jumping through waves Snorkeling in Turtle Bay Swimming in nature Swimming in ocean Swimming in pond Swimming in river Swimming in still water Swimming in water Swimming in wave in ocean
Playfully engaging with nature	Creating with nature's materials	Building sand castles Building snowman Making bracelet with leaves Making rock structures Making S'more sticks

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Emulating an animal Playing in and with nature's materials	Acting like bird Jumping in piles of leaves
	Playing with water	Making pile of leaves Making snow angels Making snowballs Playing in leaves Playing in nature Playing with nature's materials Playing with willow branches Jumping in puddles Playing in rain Throwing rock into water
	Visualizing images in nature features	Seeing dog shape in tree canopy Seeing giraffe shape in cloud Visualizing animal shapes in clouds Visualizing face in rock formation
Preparing foraged, harvested, captured, or raised edibles for eating or drinking	Killing an animal	Killing chickens
	Making foraged tea Preparing foraged, harvested, captured, or raised edibles	Making tea from foraged materials Cleaning fish Cooking chickens Cooking collected edibles Cooking fish Cutting up fish Making dinner from collected wild edibles
Reading signs of nature	Identifying processes in nature	Seeing ice melting into river Seeing relationships in nature Seeing stream of water picking up debris
	Reading signs of animals	Coming across deer tracks Finding mountain goat fur Following animal footprints Following animal trails Seeing deer tracks
	Reading signs of fire	Tracking animals Seeing wildfire smoke

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Reading signs of weather Seeing evidence of animal homes	Counting seconds between thunderclaps Finding shells Seeing broken shells Seeing colorful shells Seeing eagle nest Seeing shells
Recreating in nature with others	Recreating in nature with others	Being pelted by snowballs
Seeing fungi	Seeing fungi	Looking at mushroom Seeing mushrooms
Seeing plant life	Seeing flowers	Looking at dead flowers Looking at flowers Looking at pink flower Observing flowers Seeing colorful flowers Seeing flowers Seeing flowers in meadow Seeing pink flowers Seeing red roses Seeing rose garden at Manitou Park Seeing roses Seeing yellow flower
	Seeing grass	Looking at grasses Seeing dry grass Seeing luscious grass
	Seeing leaves	Looking at green leaf Looking at leaves Looking at red leaves Seeing leaves Seeing pine needles
	Seeing plants	Look at plants Looking at herbs Looking at mint Looking at plants Noticing seaweed Observing plants Seeing alfalfa Seeing brush Seeing clover

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Seeing trees	Seeing pink plant Seeing plant life growing Seeing plants grow through fence Seeing sage brush Seeing salmonberries Seeing white roses Looking around at trees Looking at bark Looking at tree branch Looking at trees Observing trees Seeing bigger trees Seeing differences in trees Seeing orchard Seeing pine trees Seeing pine trees off coast Seeing plum trees Seeing Ponderosa pine trees Seeing tree Seeing tree branch Seeing tree leaves Seeing trees Seeing willow branches dance in wind Seeing willow tree
Seeing wildlife	Encountering animals that can harm Seeing animals Seeing aquatic animals	Being stung by man-of-wars Looking at animals Observing animals Observing wildlife Seeing animals Seeing wild animals up close Seeing wildlife Seeing wildlife in nature Looking at species in tide pools Seeing anemones Seeing animal jump out of water Seeing animals in water Seeing corals Seeing crab next to shore Seeing crabs

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Seeing crabs at low tide
		Seeing fish
		Seeing jellyfish
		Seeing octopus
		Seeing orca
		Seeing river otters
		Seeing sea anemones
		Seeing sea animals
		Seeing sea creatures in waves
		Seeing sea otters
		Seeing snapping turtle in (Named) Lake
		Seeing starfish
		Seeing starfish in waves
		Watching seals
	Seeing birds	Seeing bird flying
		Seeing birds
		Seeing blue bird
		Seeing ducks swimming in water
		Seeing eagle
		Seeing herons
		Seeing many blue birds
		Seeing owls perched in trees
		Seeing seagulls
		Seeing wild ducks
		Watching birds
		Watching birds from distance
		Watching birds in sky
		Watching ducks
	Seeing insects	Noticing pollination
		Observing water bugs
		Seeing bees
		Seeing bees on flowers
		Seeing insects
		Seeing worm-like animal
	Seeing land animals	Observing wolves
		Seeing bears
		Seeing bull snake
		Seeing coyotes
		Seeing deer

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Seeing deer eat sage brush Seeing deer run Seeing garter snake Seeing mice Seeing rabbits Seeing rodent Seeing rodents Seeing small animals on ground Seeing snakes Seeing squirrels Seeing tiger in zoo Seeing voles Seeing wild cats Seeing wolves
Seeking and catching animals to eat	Catching fish	Catching big fish
		Catching bluegill
		Catching fish
		Catching small fish
		Reeling in fish
	Crabbing	Crabbing by ocean
		Crabbing in ocean
	Fishing	Fishing at lake or pond
		Fishing for food
		Fishing from boat on river
	Fishing in river	
	Fishing in water	
	Fishing on lake	
	Fishing on still water	
	Fishing on water	
Flyfishing	Flyfishing for trout	
	Flyfishing in river	
	Flyfishing on lake	
Shrimping	Shrimping on ocean	
Seeking connection with animals	Choosing pet	Picking out dog for pet
	Commingling with animals	Shoving off insects
		Sitting in river with fish
		Standing in water with fish

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Engaging in physical contact with animals	Catching bunny
		Holding chickens
		Holding ducks
		Holding fish
		Petting bunny
		Picking up chickens
		Picking up snail shell
		Touching crab
	Experiencing nature with pet	Exploring nature with cat
		Noticing chicken behaviors
		Walking with cat in nature
		Watching cat climb trees
		Watching cat explore nature
		Watching cat in nature
	Identifying animals	Identifying ducks
	Playing with animals	Chasing chickens
		Chasing ducks
		Playing fetch with dog
		Playing outside with cat
		Playing with big dog
		Playing with toys with cats
	Seeking comfort from animals	Being comforted by dog
		Cuddling with little dog
		Curling up with dogs
		Seeing puppy
		Sleeping on bear
		Snuggling with dog
		Snuggling with Kirby
	Talking to animals	Playing recorded bird sounds for birds
		Recording bird sounds
		Talking to birds
		Talking to dog
		Whistling to bird
	Working with animals	Training bird
		Working with bunnies
Seeking connection with plants	Embracing or being embraced by plants	Being blanketed by leaves
		Being caught by tree

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
	Identifying plants Making physical contact with plants Talking to plants	Being covered by grass Being held by pile of leaves Being hugged by tree leaves Hugging tree Identifying plants Feeling tree Talking to flowers Talking to trees
Sheltering in nature	Camping in nature Preparing campfire Seeking shelter	Camping by river Camping by waterfall Camping in nature Camping on mountain Setting up campsite Burning firewood Gathering firewood Making campfire Finding campsite in nature Seeking shelter in forest Seeking shelter near water
Touching earth and sky together	Touching ground	Touching mountains
Traversing through nature	Crawling in nature Hiking in nature Moving off established trail Walking in nature	Army-crawling along ground Hiking high in mountains Hiking in forest Hiking in mountains Hiking in nature Hiking on gravel Hiking uphill Hiking off trail Walking around garden Walking in mud Walking in nature Walking in sand wearing boots Walking in shallow, fast-moving water Walking through arched gateway of trees Walking through garden Walking through grasses
Viewing groundscape	Looking at ground	Looking at soil Seeing dirt

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Seeing fallen pine needles Seeing irrigation ditch Seeing rocks Seeing sand Seeing trail Seeing trail of pine needles Seeing trail of rocks Seeing tree roots
Viewing landscape	Looking at landscape	Looking at forest Looking at glacier Looking at mountains Seeing blue mountains Seeing cave Seeing cliff Seeing cliffs Seeing coast Seeing different shapes of mountains Seeing forest Seeing glacier Seeing glacier ice Seeing hills Seeing ice on mountain Seeing into forest Seeing islands Seeing landscapes Seeing mountain Seeing mountains Seeing Mt. Rainier Seeing rock formation Seeing valley Viewing forest next to ocean
Viewing nature from a different vantage point	Looking down from high vantage point	Looking down at waterfall Looking down from lookout tower Looking down from tree Looking down mountain
	Looking out from high vantage point	Looking across river from bridge Looking at view

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Looking out from hillside
		Looking out from hilltop
		Looking out from local mountain
		Looking out from mountainside
		Looking out from mountaintop
		Looking out from trees
		Looking out from up high vantage point
		Looking out from watch tower
		Seeing everything from high up in tree
		Seeing pretty views from mountainside
		Seeing valley from hillside
		Seeing view from hilltop
		Seeing view from mountainside
		Seeing view from up high
		Seeing views at mountaintop
	Looking up to high point	Looking up at tree
Viewing plant life	Seeing trees	Seeing branches
		Seeing trees
Viewing skyscape	Looking at sky	Seeing blue sky
		Seeing clouds
		Seeing clouds combine
		Seeing clouds from mountainside
		Seeing light in sky
		Seeing sky
		Seeing sun
		Seeing sun behind tree
		Staring up at sky
		Watching clouds go by slowly
Viewing snowscape	Looking at snow	Seeing deep snow
		Seeing light reflected off snow
		Seeing powder
		Seeing snow
		Seeing snow coming down
		Seeing snow melting down from glacier
		Seeing snow on grass
		Seeing snow on trees
		Seeing sunlight reflecting off snow
Viewing waterscape	Looking at water	Looking at calm lake
		Looking out at ocean

Level 3 IP (n=61)	Level 2 IPs (n=204)	Level 1 IPs (n=985)
		Noticing blue water
		Seeing [Named Lake]
		Seeing boundary between freshwater and seawater
		Seeing clouds reflected in water
		Seeing colors of river
		Seeing eddy in water
		Seeing iceberg lake
		Seeing islands reflected in water
		Seeing mini waterfall
		Seeing mountains reflected in water
		Seeing ocean
		Seeing ocean for miles and miles and miles
		Seeing pond
		Seeing river
		Seeing sun reflected in water
		Seeing tide pools on rock
		Seeing water
		Seeing water bend around boat
		Seeing water fall down
		Seeing water low around rocks
		Seeing water splashing
		Seeing waterfall
		Seeing waterfalls
		Seeing waves
		Viewing waterscape
		Watching river
		Watching waterfall
	Looking into water	Looking into ocean water
		Seeing mud under water

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