# The Effects of COVID-19 on PPE Litter on U.S. Coastlines

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## ABSTRACT

COVID-19 has increased the demand of single use plastics and Personal Protective Equipment (PPE) materials. This increased usage of single use plastic items poses a long-term environmental threat to ocean ecosystems. In this study, I examined the effect COVID-19 has on beach litter and beach cleanup behavior. Total and monthly amount of PPE items, such as disposable and reusable masks, gloves, and wipes were calculated. I found that the total amount of beach litter collected had decreased and PPE percentages increased from March 2020 to February 2021, over the duration of the pandemic. On average, PPE made up 2.58% of litter collected during the pandemic. Monthly percentage of PPE in litter displayed a positive linear trend, indicating PPE amounts are increasing over the course of the pandemic. Despite a lower total number of volunteers participating, the amount of trash picked up per volunteer increased during the pandemic especially in spring and summer months of May, June, and July. COVID-19 has temporally decreased human pressures on beaches due to national and state mandates but new PPE litter presents issues of long term presence of plastics in our oceans. Implementing sustainable PPE practices and disposal regulations can relieve pollution pressure on marina ecosystems.

## KEYWORDS

beach litter, personal protective gear, beach cleanup, marine pollution

## INTRODUCTION

In March 2020, COVID-19 was officially announced as a global pandemic. Countries around the world implemented regulations in efforts to prioritize human health and lessen the spread of the virus. SARS-CoV-2 is an airborne virus that can infect the body typically through close contact with an infected person (CDC 2021). To prevent the spread of COVID-19, countries implemented mandatory mask mandates and lockdown orders. Global governments, including the U.S., took precautions, such as social distancing practices, stay-at-home orders, and temporary suspense of indoor dining and the use of reusable items in stores. These precautions have slowed the spread of the coronavirus, but have increased demand for single use plastics and Personal Protective Equipment (PPE) items. High demand from medical facilities and the general public has increased the production of masks since the start of the pandemics. China saw a production increase to 200 million masks per day in June 2020 (Aragaw 2020). In addition to an increased demand for medical PPE, there has also been in increase demand for single use plastics. Dining and shopping restrictions and shifts in consumer behavior have increased the usage of single use food packing and to-go containers (Grashuis et al. 2020). Singe use plastics have also increased due to increased take-out orders and food packing, and other regulations with suspense of reusable items in stores, such as grocery bags and coffee cups (Zambrano-Monserrate et al. 2020). Consumer preferences have shifted to time convenience and perceived safety; thus, willingness to reduce plastics has decreased during the pandemic (Kitz et al. 2021).

Single use plastics provide a safe option, but improper disposal and increased demand can put even more pressure on an already strained waste management system and create environmental problems. Increased disposal of PPE can lead to detrimental environmental effects including air pollution due to incineration, and nature pollution due to improper disposal (Sarkodie and Owusu 2020). Animals have been exposed to frequent interactions with PPE including birds using masks for nesting (Hiemstra et al. 2021) . More negative interactions with PPE include entanglement and ingestion, which can be deadly. Improper disposal led to a pile up of face masks on nature trails and beaches in Hong Kong, resulting in water pollution and fish in a nearby stream mistaking masks for food (Farah and Chow 2020). Most PPE are made of synthetic non-degradable polymers

and chemicals, posing a serious long-term threat to marine environments (Fadare and Okoffo 2020). Similar to single-use plastics, PPE is expected to travel to many areas of the ocean and stay in the ocean for a long time. PPE is expected to enter the geological record, as sea current can disperse them all around the world, and the different materials of PPE items enter lower depths and sediments (Hiemstra et al. 2021).

The increased production of plastics and PPE during COVID raises concerns about further ocean plastic pollution. Plastic pollution is already a global threat to oceans, with about 150 million tons of plastic in our ocean currently and about 8 tons entering our oceans every year (The Ocean Conservancy). There are an estimated 5 trillion plastic pieces in our oceans today with this number increasing by millions every year (Eriksen et al. 2014) . Macro and micro plastics can harm marine organisms and threaten vital marine ecosystem function. These pieces of plastic can physically entangle marine animals, be ingested, act as transport for invasive species, and end up in food chains, eventually leading back to humans (Kühn and van Franeker 2020). High demand for PPE creates a new marine litter source that can add pressure to the critical ocean plastic pollution problem. PPE has already been showing up frequently as city litter and in aquatic systems, such as rivers, beaches, and coastlines (Ammendolia et al. 2020)

In this project, I aimed to study how COVID-19 has impacted beach cleanup litter and human behavior in the United States by examining the number of PPE-related items found in Surfrider's Beach Cleanup Tool data from January 2020 to February 2021. For this study, defined the pandemic as March 2020 to February 2021. I categorized PPE items as reusable and disposable masks, gloves, and wipes. I calculated total and monthly counts of percentages of PPE and respective categories. I investigated changes in beach cleanup behavior and PPE litter over the duration of the pandemic by examining monthly trends in changes of PPE percentages and litter counts. To examine changes in monthly volunteer effort, I analyzed the number of cleanups, volunteers, and trash count.

## METHODS

### Surfrider Foundation

Surfrider is a nationwide organization with a mission to protect and enjoy our oceans. Surfrider has 70 chapters located along the U.S. west and east coasts, Gulf of Mexico, Hawaii, and Costa Rica. Surfrider's goals include improving beach access and decreasing ocean plastic pollution. Surfrider engages local chapters through coastal cleanups held multiple times each year.

I utilized data from Surfrider Foundation's Beach Cleanup Tool. The Beach Cleanup Tool is a national tool that allows members and chapters to document the details of a beach cleanup conducted including date, location, trash weight, duration, and categories of items. Data comes from all over the U.S. but is concentrated in areas with coastlines and accessible public beaches such as the West and East coasts.

**Dataset and study area**

I utilized cleanup data ranging from January 1, 2020 to February 28, 2021 in coastal and marine locations in the U.S. The dataset included cleanups from within the United States including the following states: CA, DE, CO, CT, DC, FL, HI, IL, I, MA, MD, NC, NH, NJ, NY, OR, PR, SC, TX, VA, and WA. Materials were typically collected by volunteers from coastal beaches either on land or in the water.

I conducted analysis in R Studio utilizing packages readr (Wickham 2020), tidyverse (Wickham 2019), and plyr (Wickham 2011), and ggplot2 (Wickham 2016). I defined the duration of the pandemic as March 1, 2020 to February 28, 2021 because this is when COVID-19 was officially declared a pandemic by the World Health Organization (WHO 2020).

**Analysis**

*Pandemic data*

**Total amount of PPE items.** I calculated the total count of litter items and organized them in perspective categories. I split U.S. coastal litter into categories of (A) disposable masks, (B) reusable masks, (C) latex gloves, (D) reusable gloves, (E) disinfectant wipes, and (F) other types of trash. (A) Single-use disposable masks included "Single-Use Surgical Masks" and "Single-Use Mask with Filter." (B) Reusable masks included "Reusable Cloth Mask." (C) Latex gloves

included "Latex Gloves." (D) Reusable gloves included "Reusable Gloves." (E) Wipes included "Disinfectant wipes." (F) Other items were classified as Other or non-COVID related PPE. Sections categorized as "fragments" on the Surfrider Cleanup Form were omitted from the total "other" number because of their small size. I utilized Equations 1-2.

(1) Total litter collected = (# disposable masks + # reusable masks + # wipes + # disposable gloves + # reusable gloves + # of all other trash pieces)

(2) Total PPE collected = (# disposable masks + # reusable masks + # wipes + # disposable gloves + # reusable gloves)

**Total percentage of PPE items out of all trash litter.** After all categories' totals calculations, I determined the percentage of overall PPE and individual categories. To determine percentages, I divided the total number of COVID-related items found by the total pieces of trash collected. To determine percent composition of PPE categories, I divided the different PPE category counts by the total PPE items found. I utilized Equations 3-8.

(3) Total percentage of disposable masks = (# disposable masks / # total litter) x 100

(4) Total percentage of reusable masks = (# reusable masks / # total litter) x 100

(5) Total percentage of disposable gloves = (# disposable gloves / # total litter) x 100

(6) Total percentage of reusable gloves = (# reusable gloves / # total litter) x 100

(7) Total percentage of wipes = (# wipes / # total litter) x 100

(8) Total percentage of PPE = (# total PPE / # total litter) x 100

*Monthly data*

**Monthly count of litter collected.** To determine the composition of litter and trends in monthly litter amount, I determined the overall count of litter each month. I utilized an unstandardized outlook to look at fluctuations in trash collection on a month-to-month basis.

**Monthly per-volunteer count.** I examined monthly per-volunteer count of items collected to understand changes in volunteer effort. To account for differences in cleanup efforts per month,

such as the difference in the number of volunteers and cleanups, I standardized data using the formula E = C/V, where E is the item count per volunteer per month, C is the count of litter, and V is the number of volunteers. I omitted cleanups that lacked volunteer and count data from this examination.

**Monthly percentages of PPE.** To examine changes in PPE percentages over the pandemic, I calculated the monthly percentage of litter categories and examined its linear regression fit.

## RESULTS

### Beach cleanup frequency and collection statistics

Beach cleanup frequency and collection statistics display a decrease in pounds of litter collected and numbers of volunteers; an increase in average pounds collected per volunteers, and relatively the same amount of beach cleanups from 2019 to 2020. In 2019, 47,120 Surfrider volunteers collected 299,572 pounds of trash over the span of 945 cleanups. In 2020, 8,895 Surfrider volunteers collected 80,360 pounds of trash over the span of 927 cleanups. This equates to a 73.17% decrease in pounds of litter collected, an 81.12% decrease in number of volunteers, and an 1.9% decrease in the number of cleanups conducted. From 2020 to 2019, there was a decrease in the average number of volunteers per cleanup and average pounds of litter collected per cleanup. On the other hand, there was an increase in the average pounds of litter collected per volunteer. Surfrider had an 80.95% decrease in volunteers, a 72.66% decrease in pounds collected per cleanup, and a 43.33% increase in pounds collected per volunteer (Table 1).

**Table 1. Beach cleanup statistics.** Yearly statistics obtained from 2019 and 2020 from the Surfrider Beach Cleanup Tool.

| Year | Total pounds of litter collected | Total # of volunteers | Total # of cleanups | Average # of volunteers per cleanup | Average pounds litter collected per cleanup | Average pounds collected per volunteer |
|---|---|---|---|---|---|---|
| 2019 | 299,572 | 47,120 | 945 | 49.86 | 317.01 | 6.3 |
| 2020 | 80,360 | 8,895 | 927 | 9.5 | 86.68 | 9.03 |
| % change | -73.17 | -81.12 | -1.90476 | -80.95 | -72.66 | +43.33 |

*Pandemic data*

**Total amount of COVID-related PPE items.** During the pandemic, 4,400 COVID-related PPE items found were found in beach litter by Surfrider volunteers with disposable items being found at the highest amount. PPE items were found in the descending amounts: 1,538 disinfectant wipes, 1,510 disposable masks, 856 latex gloves, 330 reusable masks, and 166 reusable gloves. Non-PPE-related items totaled 166,249 items.

**Total percentage of PPE items out of all trash litter.** COVID-related items made up a total of 2.58% of all trash litter collected. I found percent composition of PPE items in beach litter in the following descending order: 34.91% disinfectant wipes, 34.41% disposable masks, 19.40% latex gloves, 7.49% reusable masks, and 3.78% reusable gloves.

**Table 2. Percentages of total coastal litter.** Total percentages of litter from March 2020 to February 2021.

| Item Type | Total # of Items found | % out of all litter | % composition of PPE litter |
|---|---|---|---|
| Disposable Mask | 1,510 | 0.88 | 34.31 |
| Reusable Mask | 330 | 0.19 | 7.5 |
| Latex Gloves | 856 | 0.50 | 19.45 |
| Reusable Gloves | 166 | 0.10 | 3.77 |
| Disinfectant wipes | 1,510 | 0.90 | 34.95 |
| Total # PPE items | | 2.58 | |
| Other litter | 166,249 | 97.42 | |

*Monthly data*

**Monthly count of litter collected.** The monthly count of litter increased in the first 7 months of the pandemic and then decreased for the remaining 4 months. Results of monthly litter count can be broken down into two sections during the pandemic: March to October with an increasing trend, and October to February with a decreasing trend. Pandemic months by litter count in descending order was as follows: October, September, July, November, June, March, August, December, January, February, May, April. January/February 2020 versus January/February 2021 counts displayed a decrease of about 82% and 94% respectively; there was a large decrease of trash from months before the pandemic to months during the pandemic. A box and whisker analysis displays no outliers of monthly litter count during the pandemic timeframe.
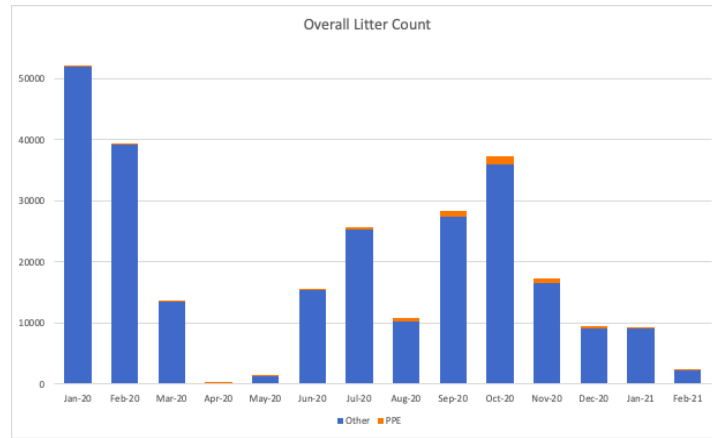
**Figure 1. Overall Monthly Litter Count.** The x-axis is a monthly timescale and the y-axis displays the total litter count with orange areas being PPE litter and the blue being all other litter.

**Monthly per-volunteer-count.** The per-volunteer count displays an increased effort by volunteers during the pandemic, with a spike in the summer months of May, June, and July. There was an average of 60.37 pieces per volunteer during the pandemic time frame compared to 20.19 pieces in the two months before the pandemic. The data det can be broken in to four time periods: before the pandemic, early pandemic, summer months, and the rest of the year. The first time period including January and February was an indicator of the average count of trash picked up before the pandemic, with an average of 20.11 items per volunteer. The next period was the early months of the pandemic in March and April, with a similar average count per volunteer of 18.79. The third period included May, June, and July; these summer months had a higher amount of trash collected compared to the surrounding months, with an average of 116.34 items per volunteer, nearly 6 times the amount before the pandemic. Lastly, August 2020 to February 2021 had similar values ranging from 39 to 66, averaging 47.69 items per volunteer, 1.5 times the amount before the pandemic. It is important to note that during the month of October, Surfrider and Love Beauty and Planet held a beach cleanup campaign that increased volunteer participation that month.
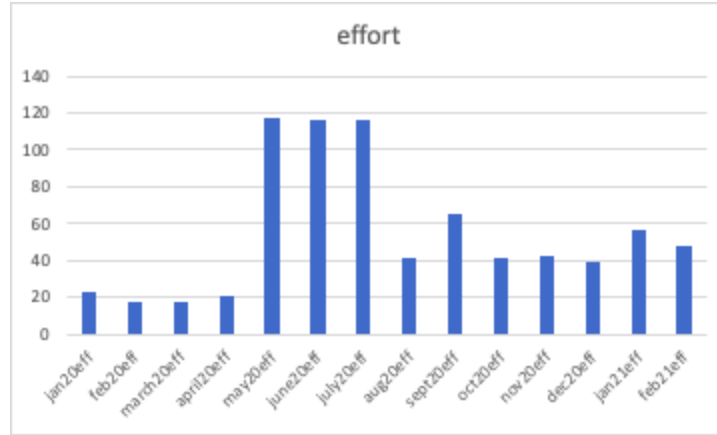
**Figure 2. Monthly Per Volunteer Count.** The x-axis represents monthly time value and the y-axis represents the effort per volunteer, calculated as total item count collected at a cleanup divided by the number of volunteers.

**Monthly percentage of PPE.** Monthly percentages of PPE during the pandemic display a large increase in PPE litter during the pandemic and an increasing linear trend. Monthly percentages of PPE average about 2.4%, while the two months before the pandemic average 0.01%, signifying an increase of the presence of PPE in litter monthly. A box and whisker plot displayed no outliers within the pandemic timeframe. There was little to no PPE found in the first defined "pandemic" month of March. Lower percentages of PPE were seen in April, June, July, and January. The highest percentage was seen in August but is still relatively close to the median PPE percentage (Figure 3). I found that monthly PPE percentages had a positive relationship over time, indicating an overall trend of increasing PPE percentages over the course of the pandemic.
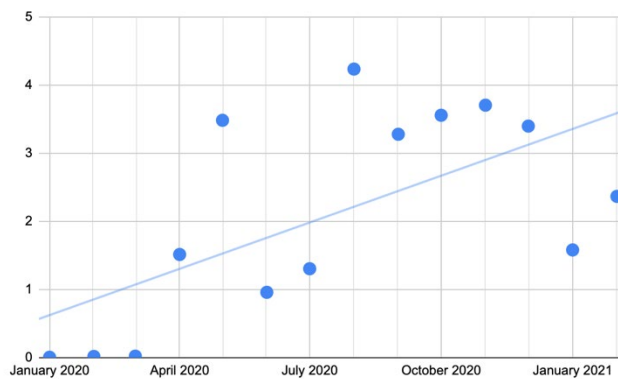


**Figure 3. Scatter plot and trendline of monthly PPE percentages.** The x axis represents monthly time value and the y-axis represents the effort per volunteer, calculated as total item count collected at a cleanup divided by the number of volunteers. The line is a fitted trendline.

**DISCUSSION**

**Introduction**

My results display that COVID-19 litter items increased in their proportion of total litter during the pandemic, although there has been less beach litter overall. PPE litter made up 2.58% of coastal trash litter found by Surfrider volunteers, with disposable items, such as wipes and masks being found at the highest frequency. Monthly percentage of PPE increased over the course of the pandemic, due to accumulation of litter overtime and increased abundance of these items. Monthly analysis of litter counts displays consequences of government COVID regulations and potential seasonal patterns. The overall amount of single-use PPE sparks conversation about how to properly dispose of this litter even after it is picked up and how to combat this new litter in marine ecosystems going forward. This study can be used to compare plastic litter pollution in comparison to other nations, as well as contribute to conversations about how much new PPE is in our oceans due to the pandemic.

**Beach cleanup behavior and frequency**

COVID-19 has greatly decreased volunteer turnout and the total pounds of trash picked up. Beach cleanup frequency and behavior has decreased from 2019 to 2020. Results displayed that from 2019 to 2020 there is a large decrease in the amount of trash collected and the number of volunteers participating in beach cleanups. Beach closures, social distancing restrictions, and the suspense of Surfrider chapter cleanups likely played a major role in these decreases (Zielinski and Botero 2020). Lockdowns and social distancing restrictions have led to large decreases in global tourism and is greatly affecting beach tourism globally (Zielinski and Botero 2020). Beaches were shut down in states such as California, Florida, and Hawaii. Beach closures in other countries have led to visibly cleaner beaches and water (Ormaza-González and Castro-Rodas 2020). Decrease in volunteer turnout was likely due to the lack of cleanups hosted by Surfrider to abide by social distancing regulations and instead having more individual cleanups.

**Yearly data**

*Coastal PPE litter during the pandemic*

Overall, COVID has impacted beach litter by increasing PPE-related litter to make up 2.58% of coastal litter, with disposable items, such as masks and wipes, being the most prevalent items. This percentage of PPE resembles results of Nyali beach in Kenya which had 2.6% PPE in litter (Okuku et al. 2021). In comparison to other studies of the world, 2.58 is on the lower range. In the same study by Okuku et al., the other urban beach, Mkomani, had 55.1% PPE litter (Okuku et al. 2021). Other Kenyan beaches saw much higher percentages of PPE, with recreational beaches having around 73% PPE and surfing beaches having 25% PPE (De-la-Torre et al. 2021). Disposable items, such as wipes and masks, were the most prevalent PPE litter found, followed by disposable gloves, reusable masks, and reusable gloves in that order. It is expected that disposable items are the most commonly found PPE types, as these items hold less long-term value to the owner and were in higher demand than reusable PPE items, especially in the beginning of the pandemic (De-la-Torre et al. 2021). Disinfectant wipes and disposable masks were found at the highest frequency on U.S. coastlines. Litter on the streets of Mkomani and Nyali in Kenya also had disinfectant wipes and masks in the highest frequency (Okuku et al. 2021). Masks were the most abundant type of PPE litter in Lima, Peru (De-la-Torre et al. 2021).

**Monthly**

*Overall monthly litter*

Monthly litter totals can be an indication of beach cleanup participation and presence of litter on beaches. Monthly litter count displays possible seasonal trends and a gradual increase in litter after the two initial pandemic months until October. Results of monthly litter count can be broken down into two periods during the pandemic, March to October with an increasing trend, and October to February with a decreasing trend. The low levels of litter found in April and May can be attributed to lockdown regulations and the extreme caution many people took during this time. Little to no PPE litter was found on recreational beaches in Kenya during June, and this is

attributed to beach closures and stay-at-home orders during this time (Okuku et al. 2021). Ormaza-Gonzalez and Castro-Rodas reported cleaner beaches due to COVID mandates in May in Ecuador, such as social distancing and confinement (Ormaza-Gonzalez and Castro-Rodas 2020).

In May, June, and July, there was an increase in the overall monthly litter counts, which may be due to beach openings, summer weather, and increased volunteer effort. Some possible reasons for the increasing litter count from April to October would be increased demand for green spaces due to mental health issues and possible decreased initial wariness of the pandemic (Choi et al. 2020). During the first couple weeks of the COVID-19 pandemic, stress and anxiety surrounding the pandemic were significantly increased compared to prior weeks (Wong and Alias 2021). Green spaces have been found to be a stress reliever, so the public may seek stress relief and mental restoration at beaches (Grahn and Stigsdotter 2010). Seasonal beach vitiation likely plays a role in increased litter amounts. During a typical year, summer months prompt higher visitation and longer stays at green spaces, with 53% of beach visits occurring in June, July, and August in Southern California (Dwight et al. 2007). Another reason for this increase is that volunteers are putting in more effort during this month as shown in the per-volunteer count results.

*Monthly per-volunteer count*

Monthly per-volunteer count displays an increase in volunteer effort during the pandemic with a sharp spike in the spring-summer months of May, June, and July. Overall, there were more items being picked up per volunteer during the pandemic. Volunteer attendance per cleanup decreased by 81% during the pandemic, which could lead to less social distraction and more awareness to trash (Figure 1). Increase in volunteer effort during the summer was likely due to increased trash due to higher beach attendance and volunteers spending more time cleaning up due to the warmer weather. With increased visitation to beaches, there is also increased beach litter (Zielinski and Botero 2020). This increase in monthly per-volunteer count could be an indicator of higher amounts of trash on beaches during these summer months, even if total litter counts previously discussed are not higher during these months (Zielinski and Botero 2020). Toward the end of April, beaches that were temporarily closed in states like California due to COVID, started to open up, allowing volunteers to pick up trash that may have been accumulating in the area. Asensio-Montesinos found that even with increased cleaning operations during summer months,

more beach litter is still found during the summer due to seasonal influxes of visitors (Asensio-Montesinos et al. 2019). These results display typical seasonal effects on beach litter during the pandemic. Lastly, cleanup duration may have increased due to warm weather, leading to more trash picked up per person.

*Monthly PPE percentage*

Monthly PPE percentages increased over the pandemic with high points in May and August. This increasing number can be reflective of the overall increase of amount of PPE in the world. Linear increase of masks was seen eleven nations in North America, Europe, and Oceania, with masks making up 0.88% of trash, similar to my observed 0.88% (Roberts et al. 2020, Table 2). Roberts et al. suggests that differences in frequency of PPE found and times are due to the level and timing of intervention taken by WHO and national governments (Roberts et al. 2020). The World Health Organization estimates that healthcare workers alone need 89 million medical masks, 76 million gloves, and 1.6 million goggles (WHO 2020). Increases can also display the accumulation of PPE on beaches overtime. Further research can be done to determine why there are higher PPE percentages in May and August. High points in May may be attributed to openings of beaches in states like California at the end of April and accumulated trash. Peaks in August may be associated with increased mask usage due to California's fires which were declared a state of emergency.

**Synthesis**

COVID-19 has impacted cleanup efforts by reducing overall litter on beaches, increasing PPE presence in litter, decreasing volunteer turnout, and increasing the items collected per-volunteer. Similar to many parts of the world, the U.S. has seen a considerable drop in the amount of trash in our coastlines, which can temporarily benefit health of marine ecosystems. There has been an increase over time of PPE in litter due to its high production. Seasonal trends still appear to be present, with warmer months having increased litter amount and increased volunteer effort than cooler months. Disposable items of masks and wipes are the most frequently littered items, which can prove deadly to marine life through ingestion or entanglement. Although COVID-19

has negatively impacted many aspects of human life, reduced human presence and pressures on beaches has overall promoted environmental health. In 2020, beaches had less litter and less noise pollution, and in turn had increased species densities, cleaner wasters, and vegetative restoration (Soto et al. 2021). Coastal areas experienced short-term relief due to lockdowns and social distancing practices, but the increased PPE waste created during the pandemic poses a long term issue for marine ecosystems (De-la-Torre and Aragaw 2021).

**Limitations**

This study was limited to Surfrider Foundation collection data from January 2020 to February 2021 and mostly land collection cleanups. Because the dataset only contained pandemic months and 2 months prior to pandemic, I was unable to examine differences in monthly trends to the prior year. Changes in seasonal trends of beach cleanups were unable to be examined to derive conclusions about if pandemic percentages mirrored a normal year. The scope of this study was also constrained to Surfrider beach cleanup data. Looking at other marine litter collection organizations and apps, such as the Marine Debris Tracker app and The Ocean Conservancy, can provide insight onto a wider scope of PPE and other plastics in litter.

**Future directions**

Future directions for research include examining how COVID has impacted other categories of trash and PPE variants by location. It is important to acknowledge that this study does not encompass all the effects COVID has had on litter and plastic consumption. This study only examines how much COVID-related PPE has newly appeared since the start of the pandemic. It is also known that the COVID-19 pandemic has increased plastic consumption in ways such as increased takeout consumption, reusable bag bans, and overall an increased consumer preference for the disposability and appearance of cleanliness that plastic provides (Prata et al. 2020). Takeout boxes, utensils, straws, coffee cups, and other single-use item litter have increased in demand due to the pandemic (Prata et al. 2020). Examining how other percentages of these different plastic items can provide further insights into how COVID-19 has holistically impacted beach litter composition. Surfrider's cleanup dataset provides details on location by beach and state.

Examining how PPE percentages in trash differs by state would be interesting to see how possibly different political standings, government mandates, and other factors may play into the amount of PPE found in different areas. Different countries around the world have observed different PPE litter percentages and densities, even on a local scale of urban beaches versus recreational beaches in Kenya, there was a 52.5% difference in the PPE found in beaches of the same city (Okuku et al. 2021). Roberts found that mask legislation accounts for different increases of mask proportions in different countries of North America, Europe, and Oceania (Roberts et al. 2020).

**Broader implications**

Moving forward, it is important to examine changes in PPE percentages and trash litter amount, as well as implement sustainable PPE practices and beach regulations. As beaches open and social distancing practices decrease with vaccines, it is important to track how litter changes over time. Continuing to track how the U.S. and other parts of the world are contributing to PPE pollution is important create sustainable practices and solutions. Sustainable solutions for PPE include bio-based face masks, such as one composed of wheat gluten biopolymers (Das et al. 2020). Even across political parties, mask style is not heavily correlated with one political partisanship, except a slight preference for cloth masks for Democrats compared to Republicans (Green et al. 2021). Thus, steps towards more sustainable solutions of masks may be a successful pursuit across Americans. Most beach litter is discarded by beach goers, not washed up from shore, so proper access to disposal can reduce litter amounts (De-la-Torre et al. 2021). Moving forward, it is important to properly dispose of PPE and extra plastics used during this time. Ocean pollution is a crisis that is worsening over time; therefore, minimizing our waste, including the increased use of PPE, is crucial for the ecologic health and biodiversity of our oceans.

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