Forecasting of Camping Reservations

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20+ years of marketing experience working for software and manufacturing companies

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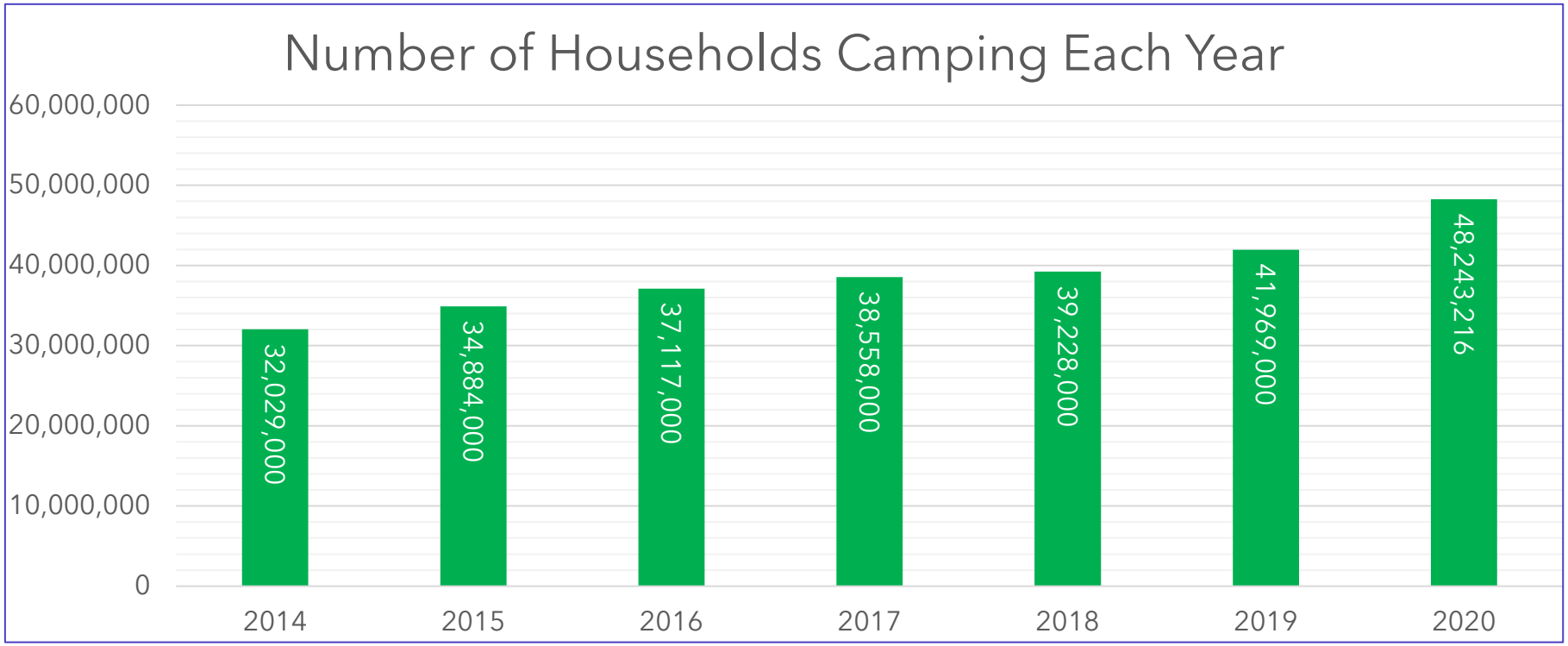
Avid camper

More people are camping and people are camping more often, how do we predict demand?



121%

Increase in households camping 3+ times/year from 2014-2020

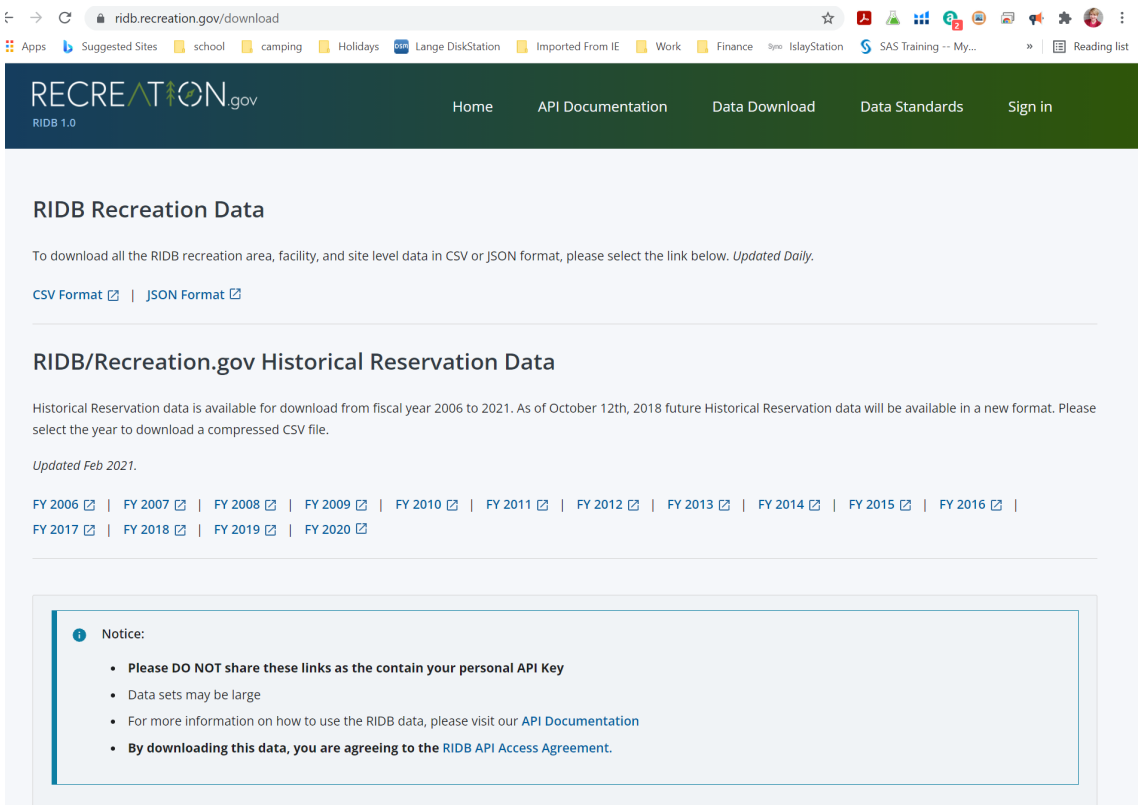
(Kampgrounds of America Inc. - 2021 North American Camping Report, 2021)

Can time series forecasting accurately predict camping reservations?

Null hypothesis:
2020 pandemic did not affect camping reservations for federal campgrounds in Washington state.

Alternate hypothesis:
2020 pandemic affected camping reservations in federal campgrounds in Washington state

Data Used In This Project



- Publicly available reservation data from Recreation.gov
  (*Recreation Information Database - RIDB*, n.d.)
- Reservation data from 2010-2020 downloaded
- Federally managed campgrounds including
  - National Park Service
  - US Forest Service
  - US Army Corp of Engineers
  - Bureau of Land Management

Tools

- Recreation.gov for csv files
- R and RStudio to prepare and analyze the data
- Power BI for data exploration

Data Preparation Process

Filter & Select

- Filter for only WA state and overnight reservations
- Select columns for analysis
- Create separate tables for each agency

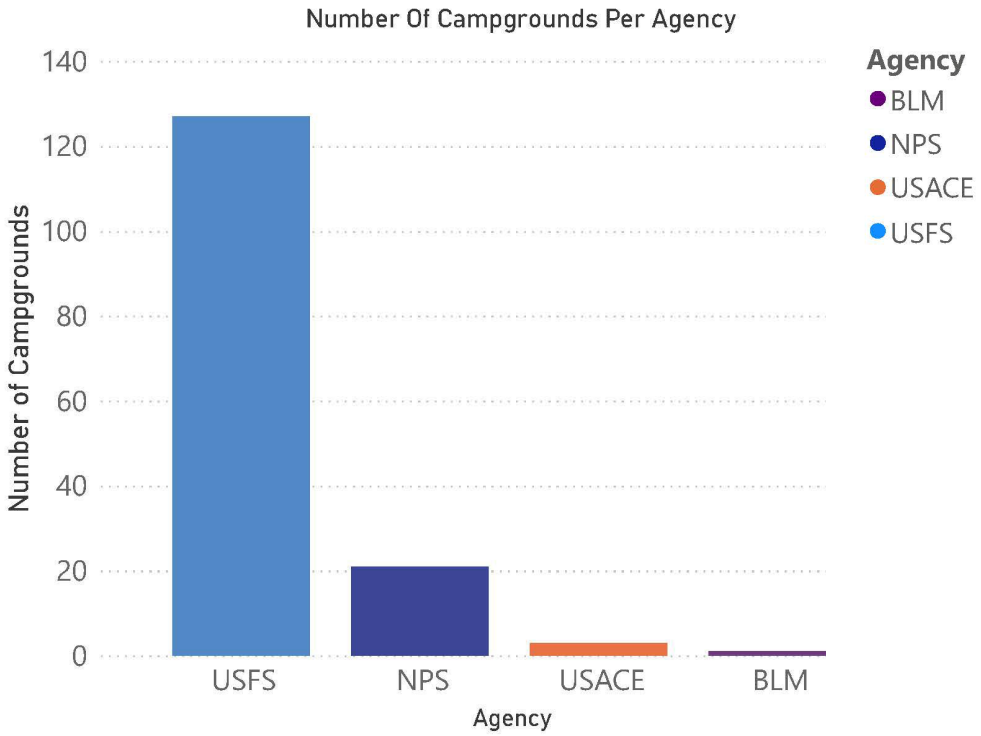
Convert

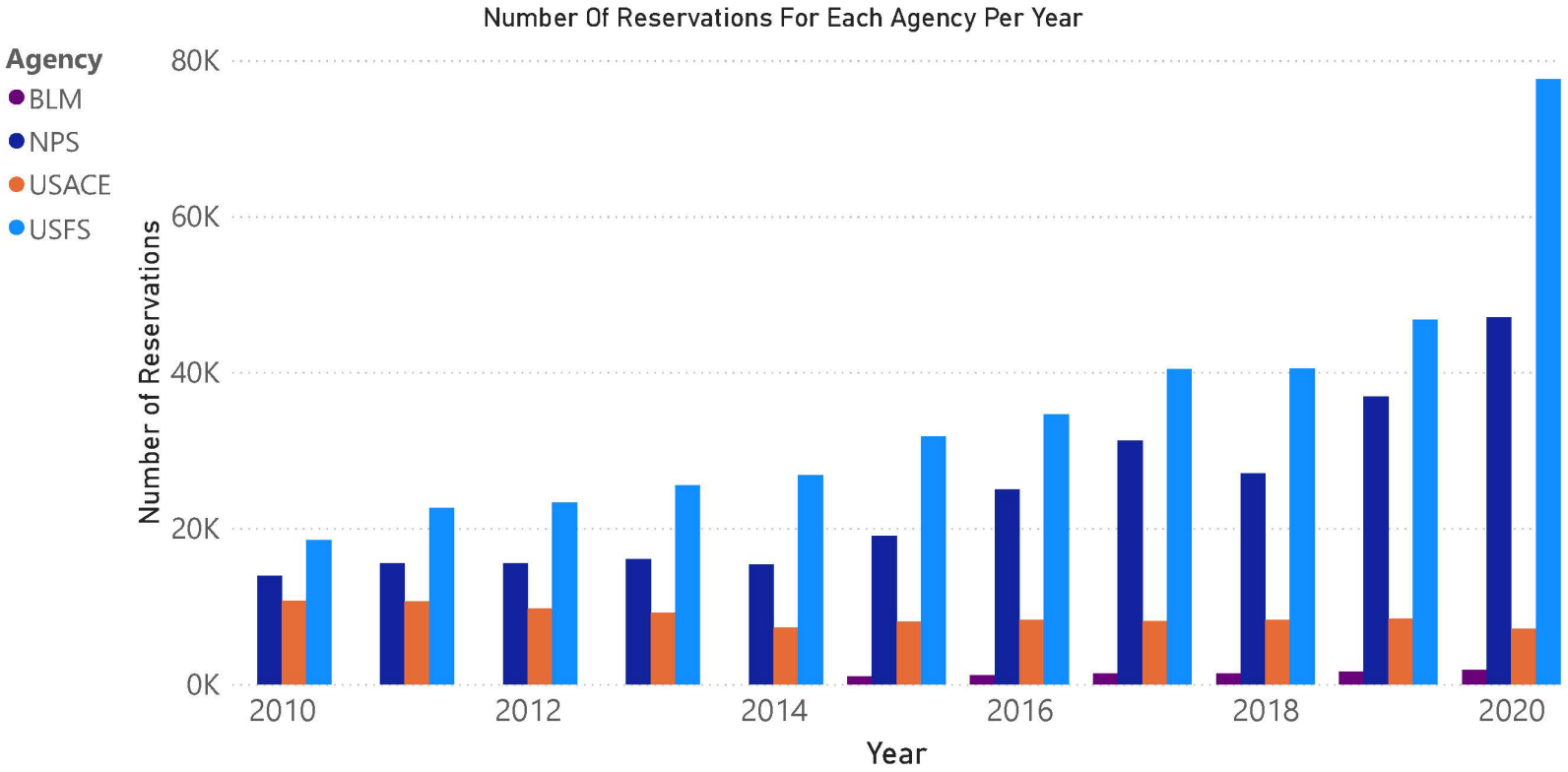
- Use Start Date and End Date to determine what days each reservation was for (Stibu, 2016)
- Sum the number of reservations per day or per month
- Fill in missing dates to get complete year (Nishida, 2018)

Create

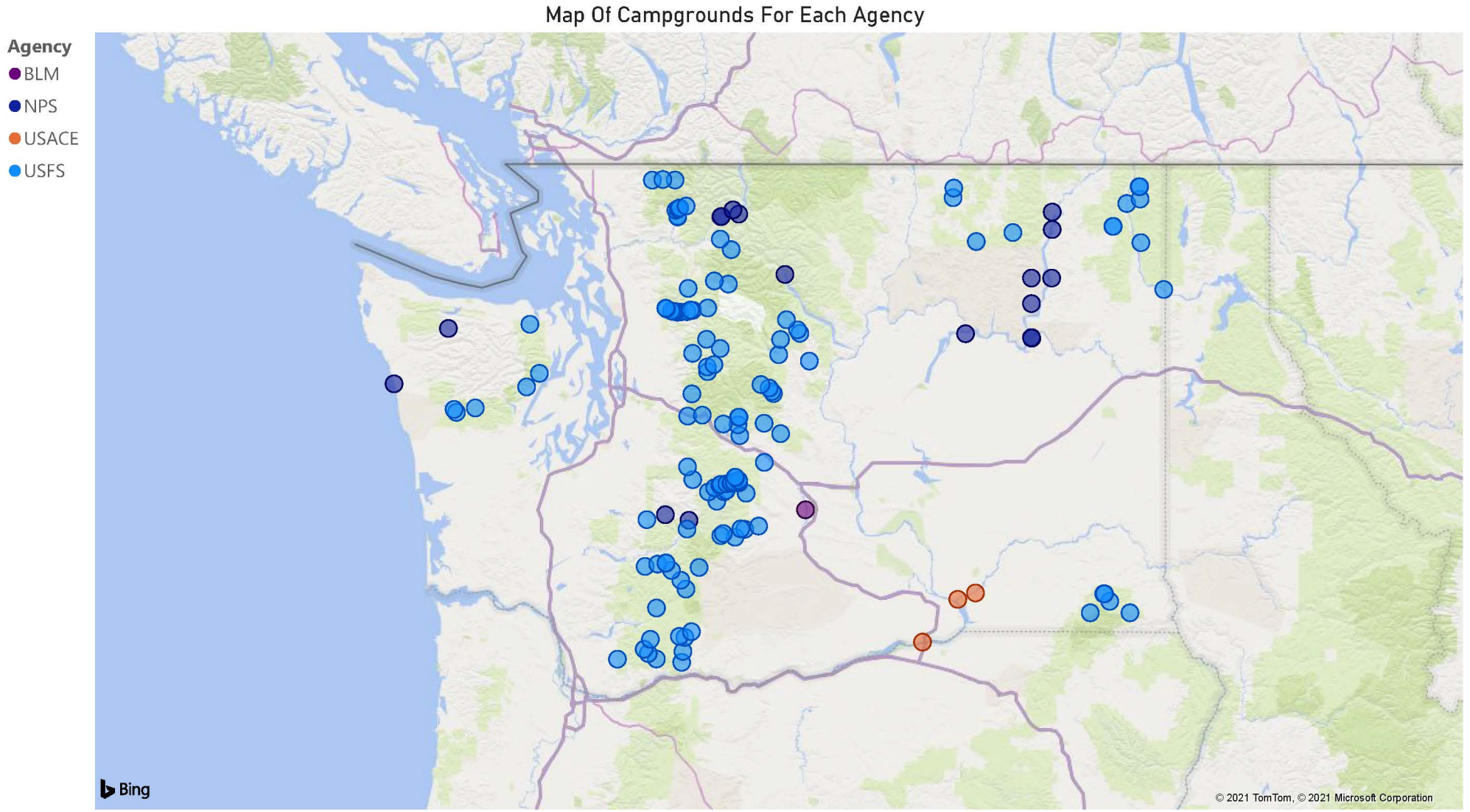
- Create time series objects from reservations per day or month data

Data Exploration

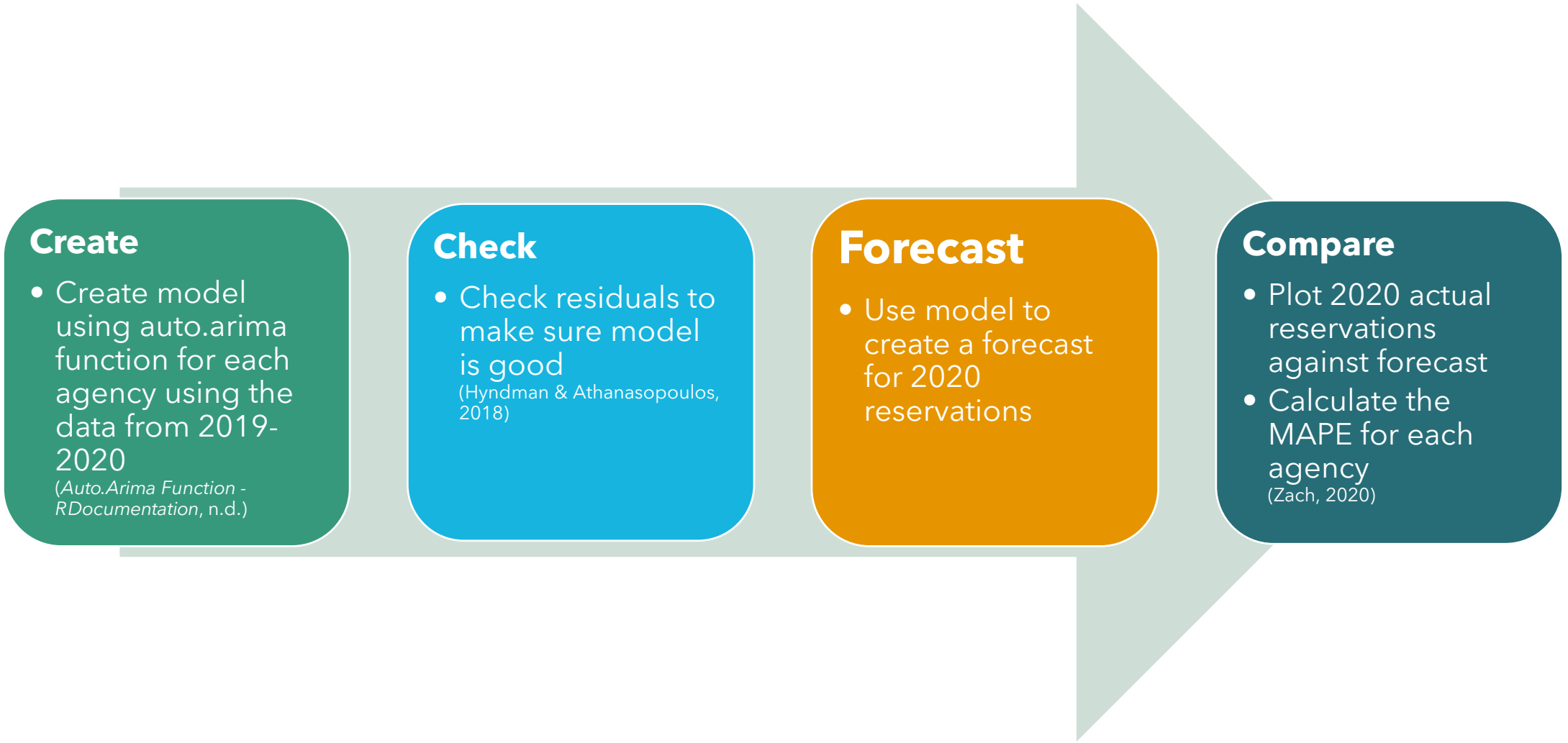




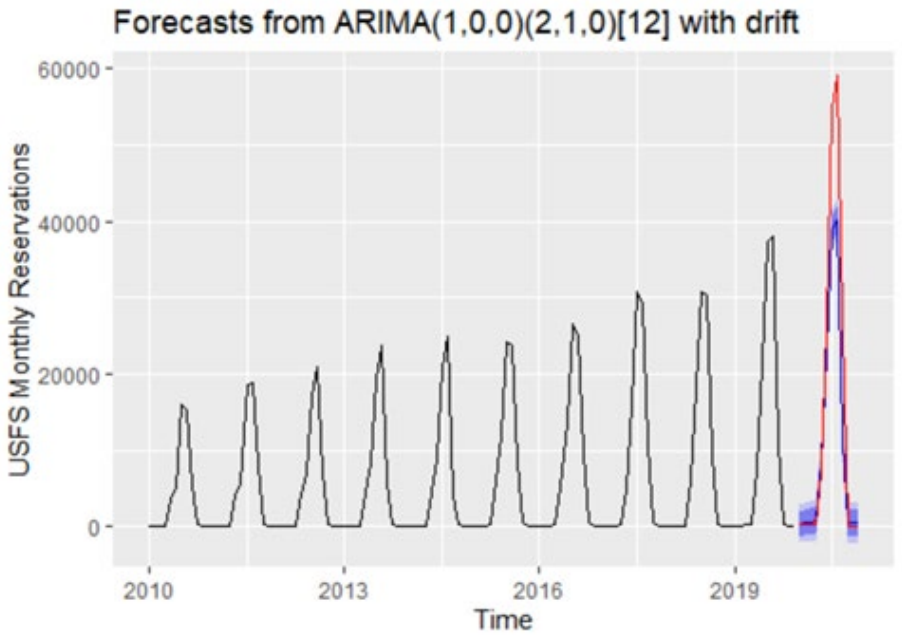
Where are the campgrounds?

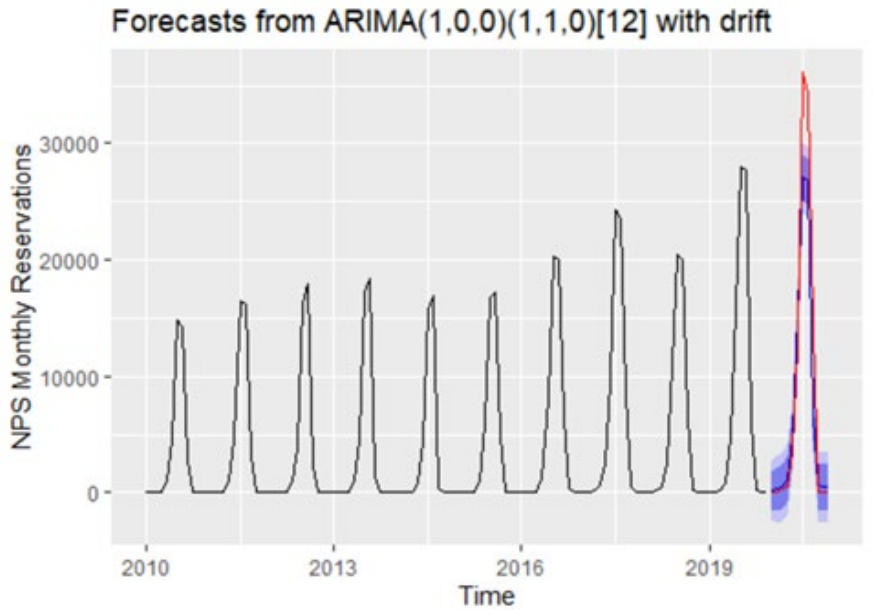


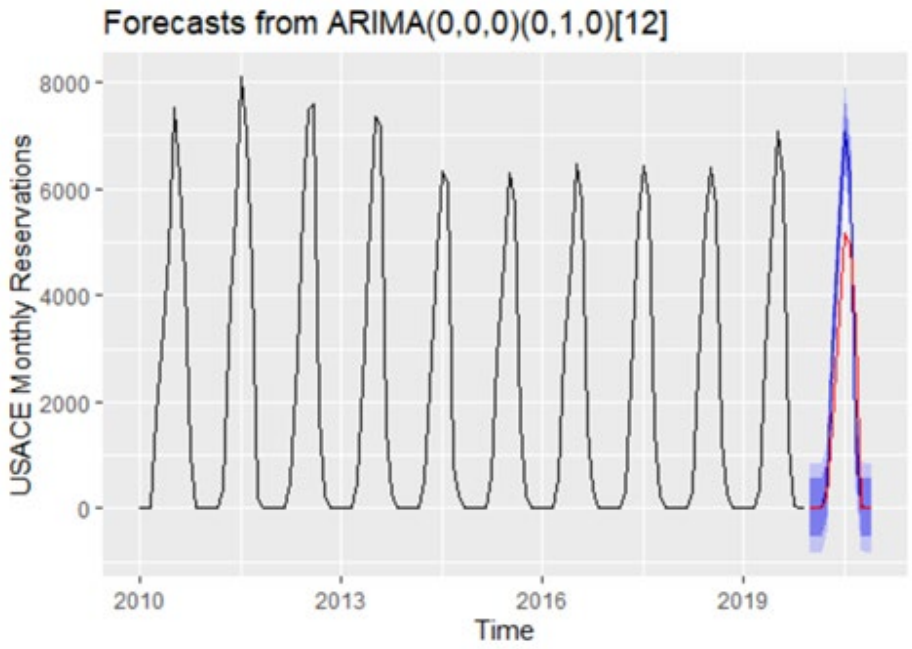
Data Analysis Process

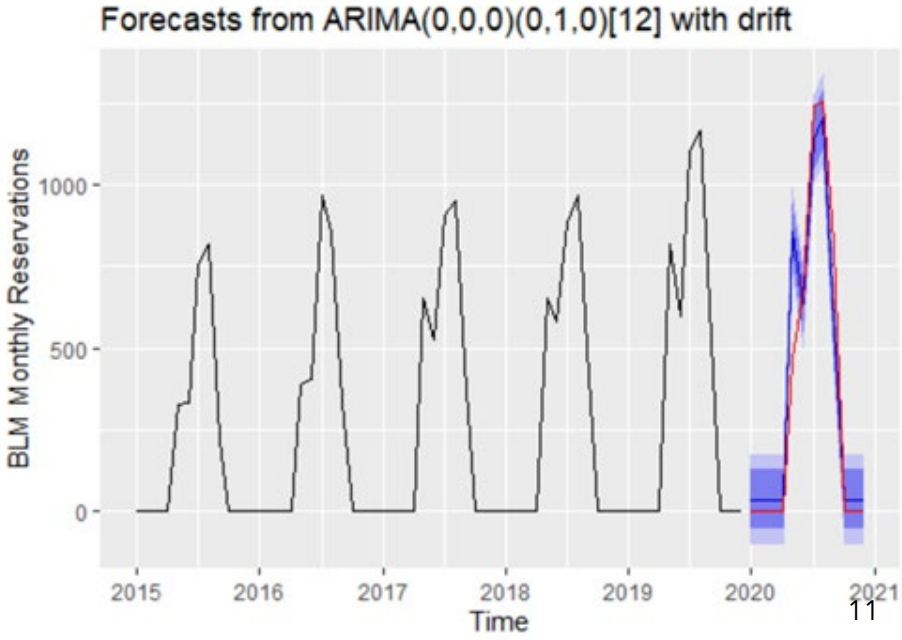


Forecast vs. Actual Plots









Results

	USFS	NPS	USACE	BLM
MAPE (Zach, 2020a)	248.01%	177.07%	81.00%	26.74%
Null Hypothesis	Reject	Reject	Reject	Reject
Alternate Hypothesis	Accept	Accept	Accept	Accept

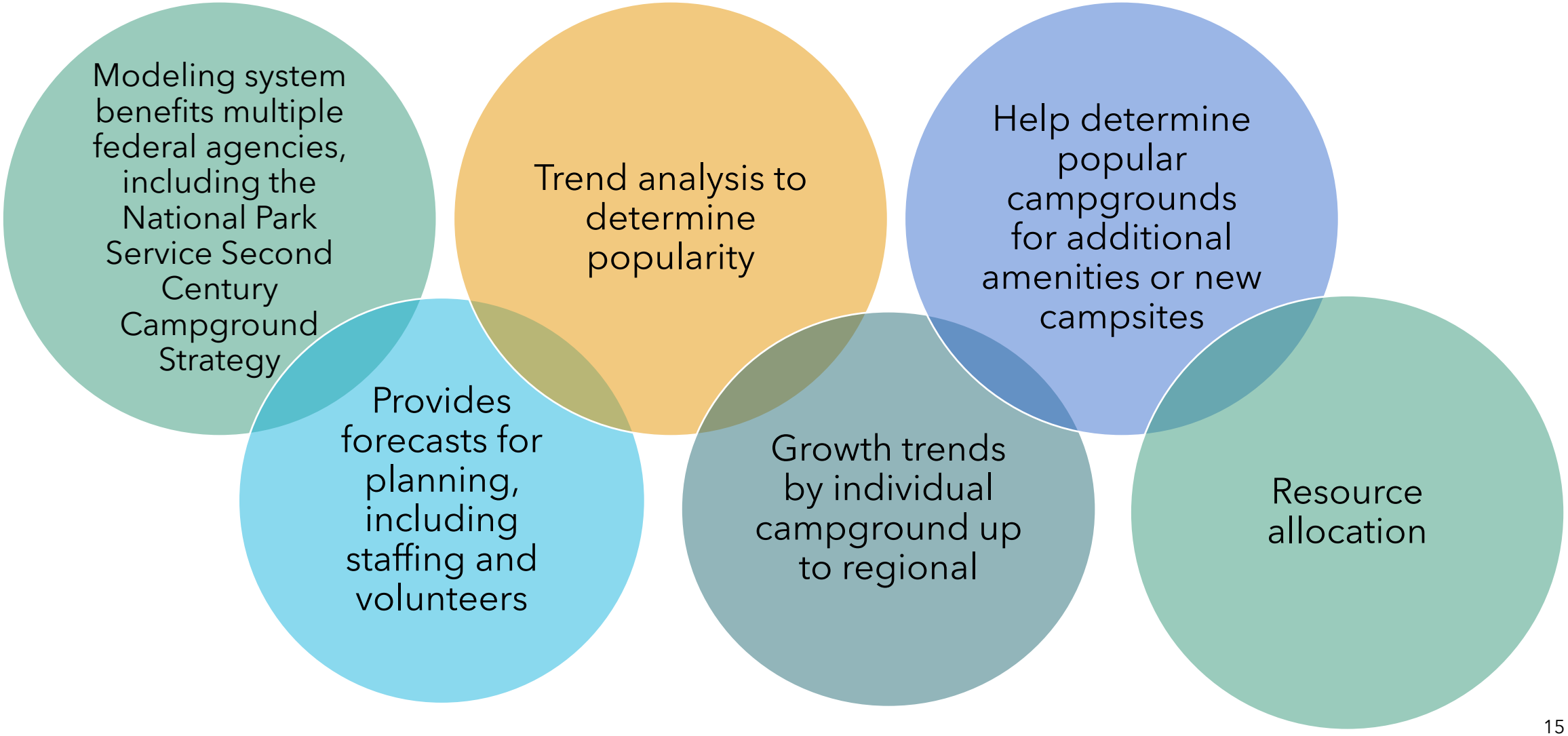
Limitations

Data	Tools	Process
Online reservation data only, did not include walk-up bookings.	R and RStudio slow to process large data sets. Daily data took hours to process.	More flexibility in defining model if auto.arima isn't used.

Recommendations

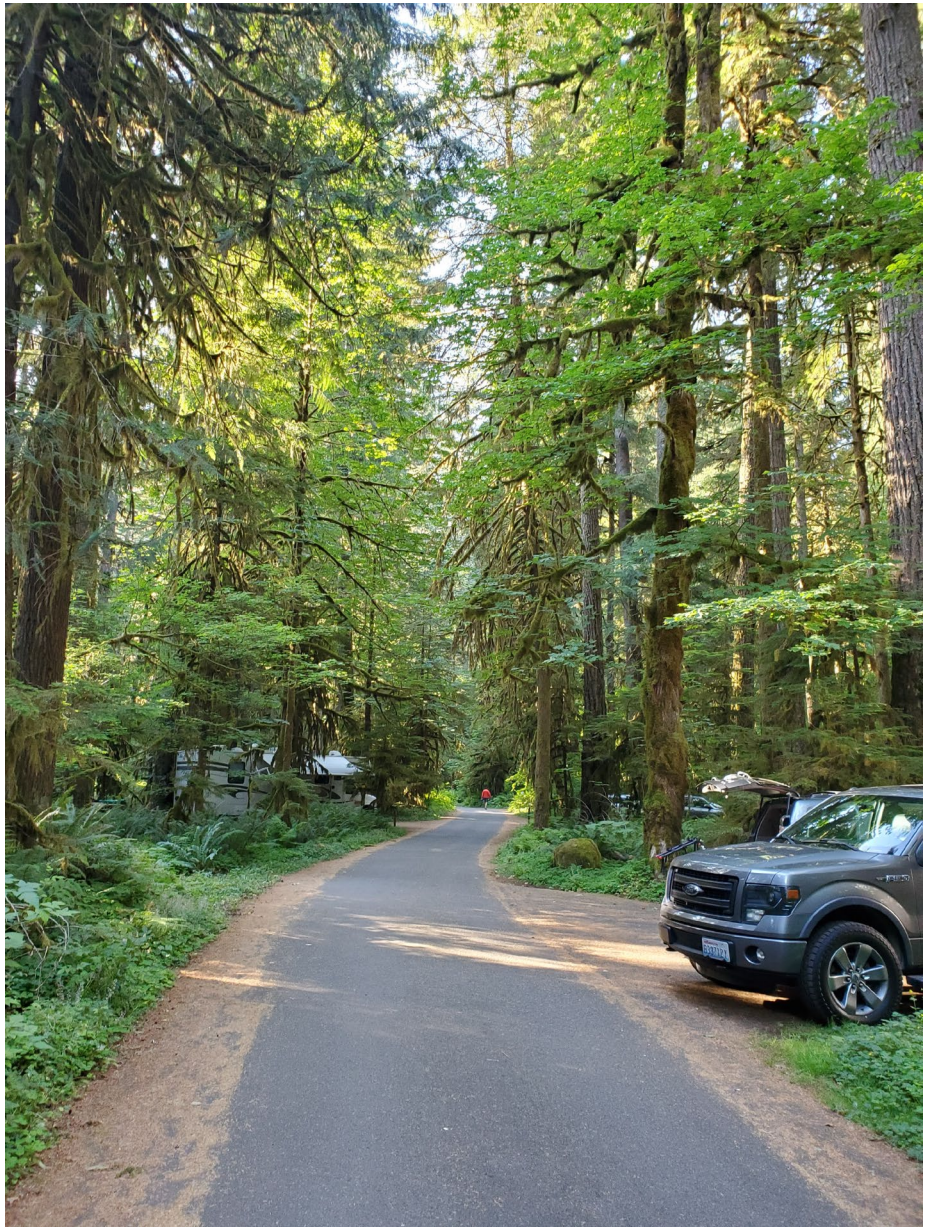
- Build models using 2020 and 2021 data
- Individual campground models
- Compare campgrounds in proximity for popularity differences
- Regional models for differences in growth between regions

Benefits


Modeling system benefits multiple federal agencies, including the National Park Service Second Century Campground Strategy
Trend analysis to determine popularity
Help determine popular campgrounds for additional amenities or new campsites
Provides forecasts for planning, including staffing and volunteers
Growth trends by individual campground up to regional
Resource allocation

Summary

Camping is growing. By using time series modeling and forecasting, federal agencies can use the results to help with resource allocation, trend analysis and planning.



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Thank you