PREDICTING OCEAN MICROPLASTICS

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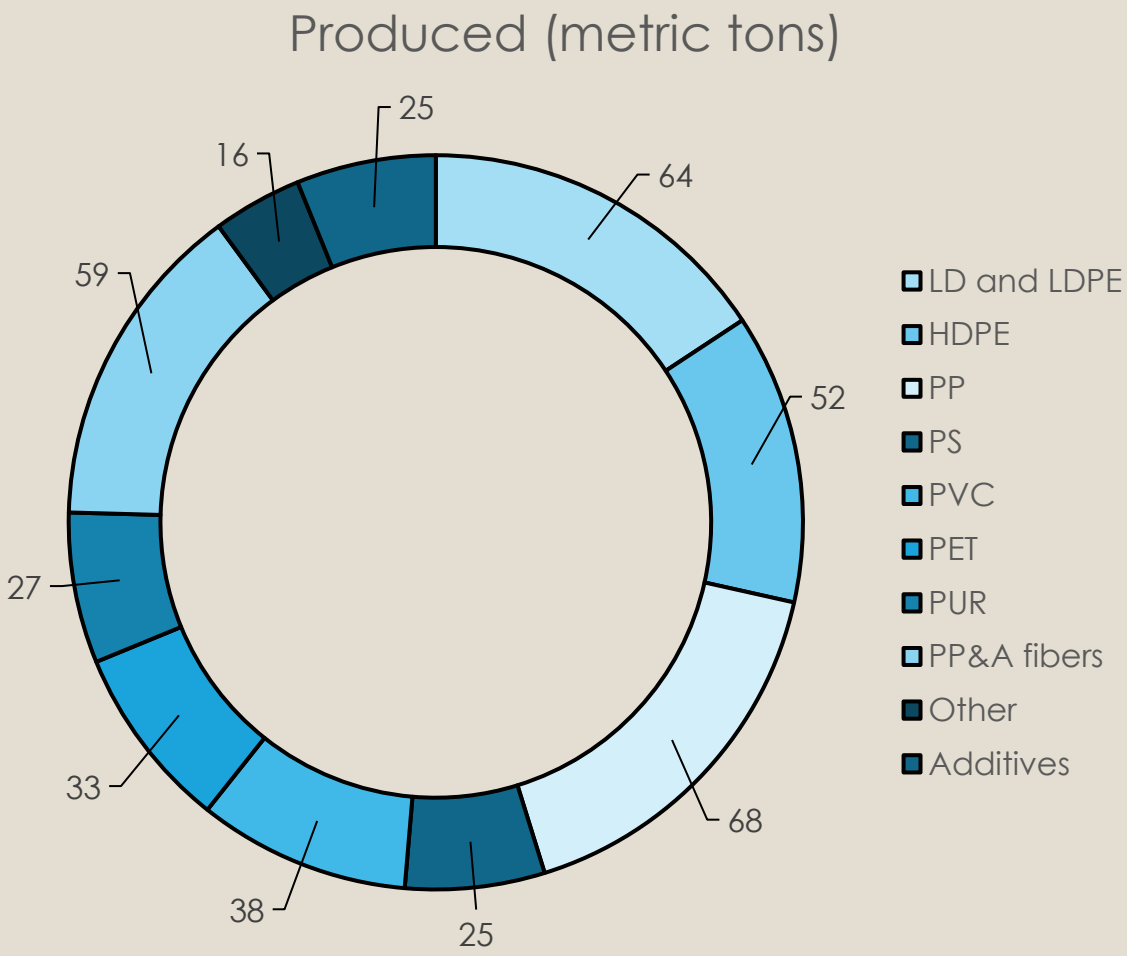
DSC680-T301

PLASTIC USE HISTORICALLY

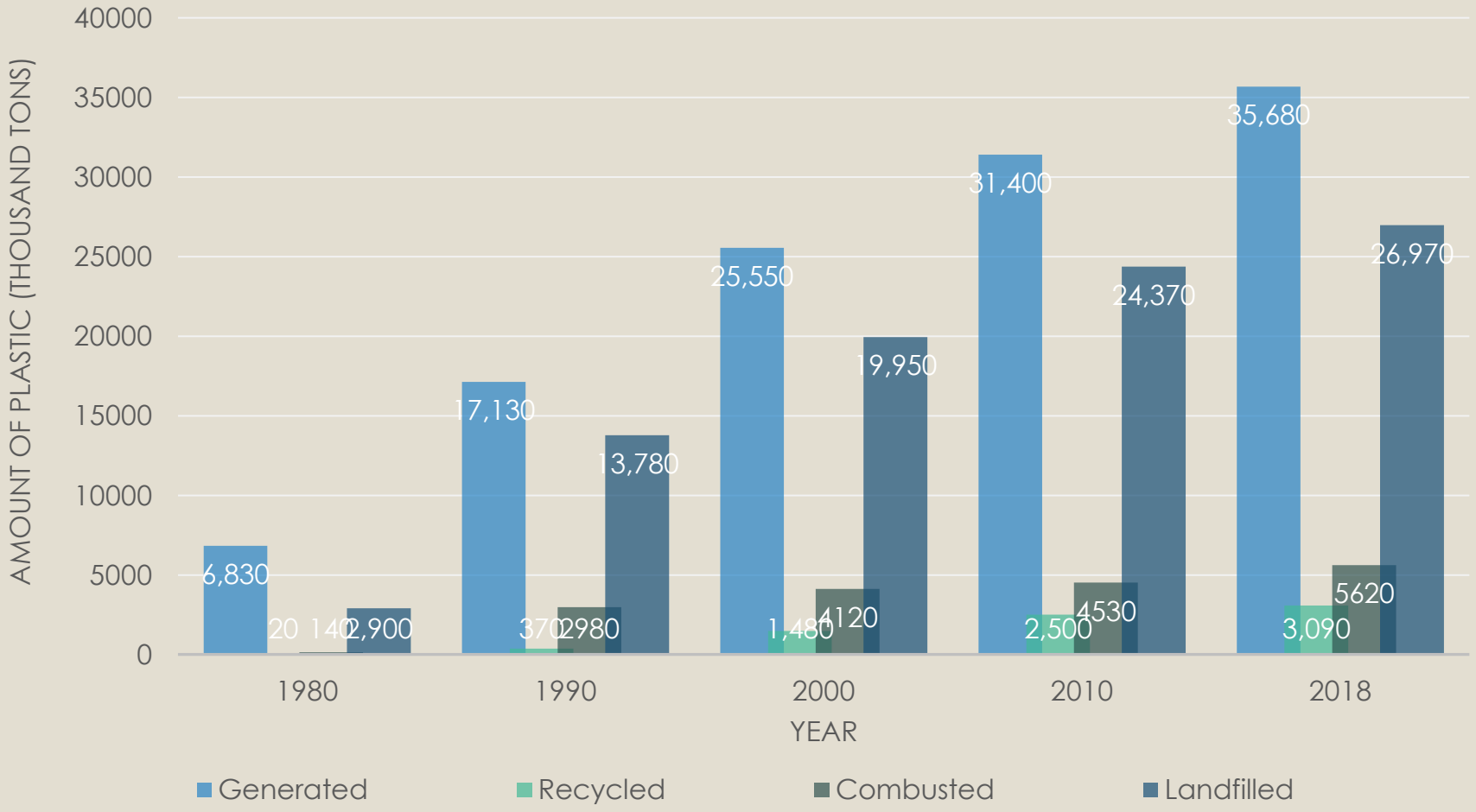
- The modern plastic industry took off in 1907 with Bakelite, the first fully synthetic plastic created by Dr. Leo Bakeland.
- Through the world wars, new and improved plastic materials were created such as Polyethylene (PE), Polystyrene (PS), Nylon, and expanded Polystyrene (EOS). These plastics were the gateway into future plastic usage with wartime needs.
- By 1960, 360 tons of plastic was created in a year in the US, a value which increased sevenfold by 1970.
- Recycling programs in the U.S. did not start until later in the 1970's, when massive amounts of plastic had already been created and thrown into landfills.

PLASTIC USE TODAY

- Currently there are 7 major types of plastic
  - Polyethylene Terephthalate (PET or PETE)
  - High-Density Polyethylene (HDPE)
  - Polyvinyl Chloride (PVC)
  - Low-Density Polyethylene (LDPE)
  - Polypropylene (PP)
  - Polystyrene (PS)
  - Acrylonitrile-Butadiene-Styrene (ABS)
- Compared to the 390 tons of plastic produced in 1960, in 2018 there were 35,680 tons of plastic produced in a single year.
- Of that, only 3,090 tons were recycled and 26,970 tons were left in landfills.



ADVANCEMENT OF PLASTICS

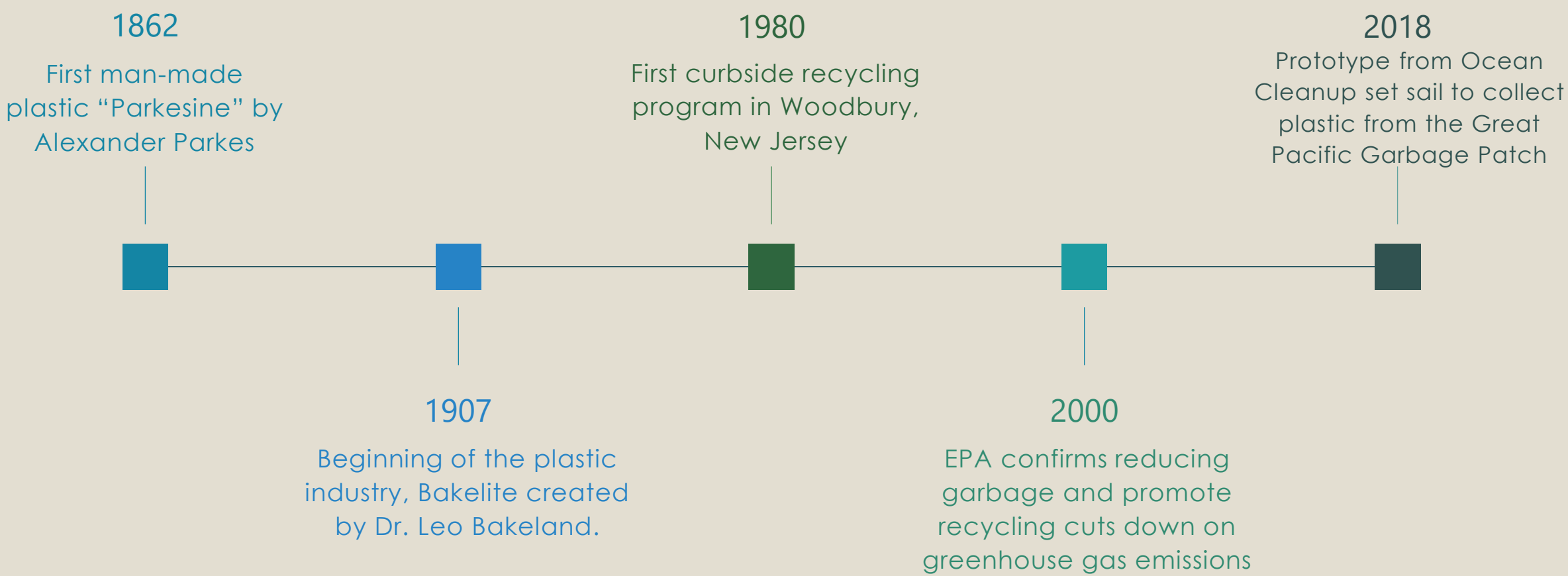


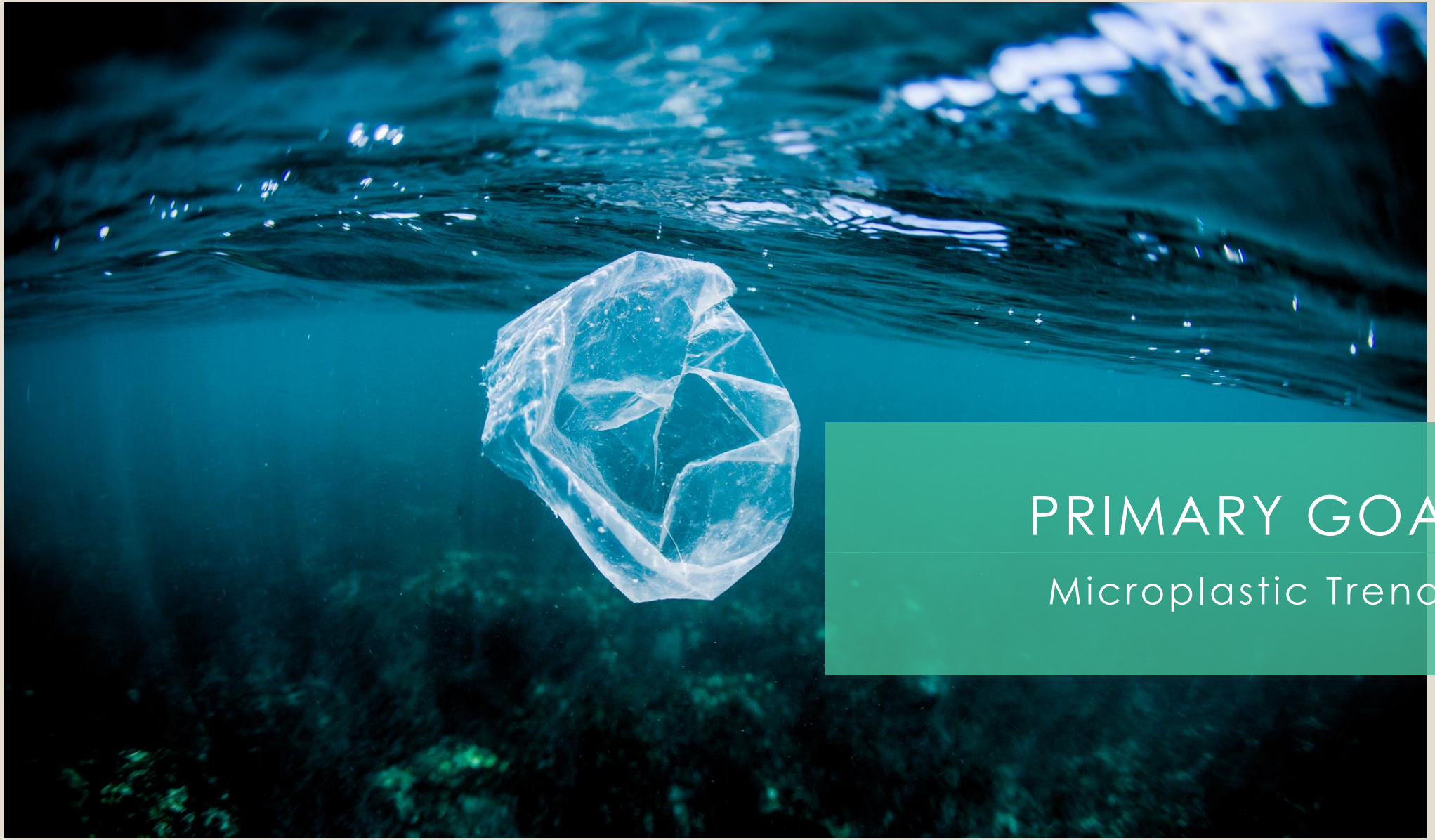
There is a gradual increase in tons of plastic generated per year gap.

There is a significant amount of plastic per year ending up in landfills versus recycled

Increasing recycling habits will prevent plastic from reaching waterways and affecting wildlife.

TIMELINE


1862
First man-made plastic "Parkesine" by Alexander Parkes
1907
Beginning of the plastic industry, Bakelite created by Dr. Leo Bakeland.
1980
First curbside recycling program in Woodbury, New Jersey
2000
EPA confirms reducing garbage and promote recycling cuts down on greenhouse gas emissions
2018
Prototype from Ocean Cleanup set sail to collect plastic from the Great Pacific Garbage Patch

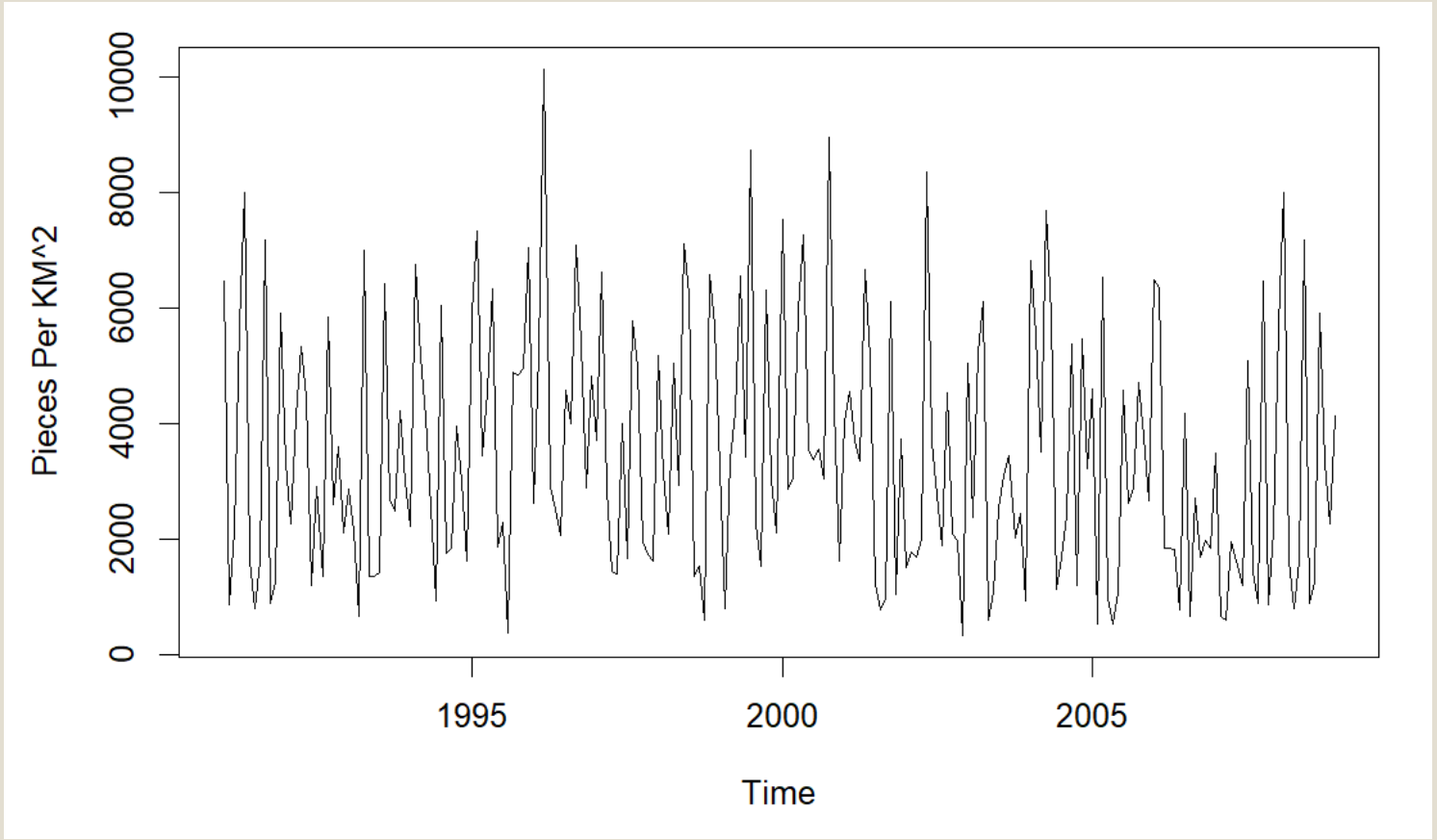


PRIMARY GOALS

Microplastic Trend Prediction

MICROPLASTICS IN THE OCEAN

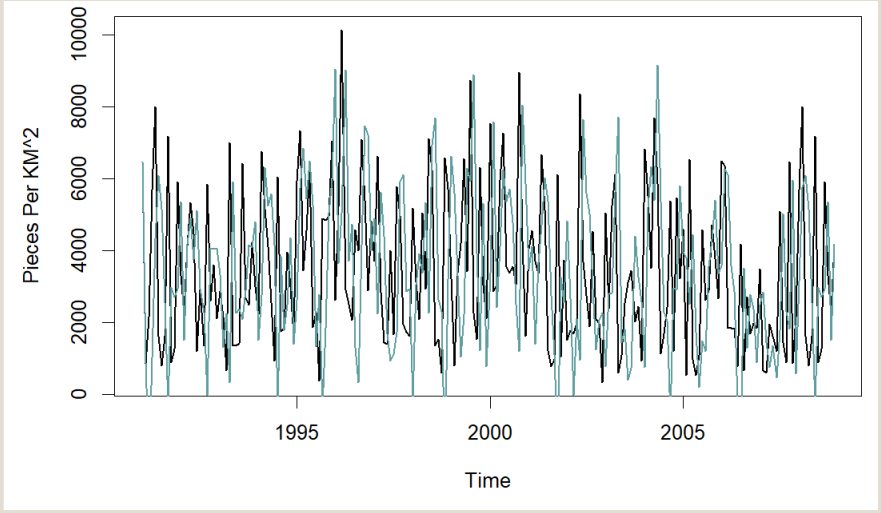
- Plastics that make it to the ocean tend to break down into microscopic pieces over time
- Pieces flow by currents, wind, and wave action and can congregate into larger plastic bunches
- On average, 2,000 to 6,000 pieces were found at each collection from 1991 to 2008.
- These pieces can be ingested by fish, filtered by crustaceans, and end up on the dinner table.

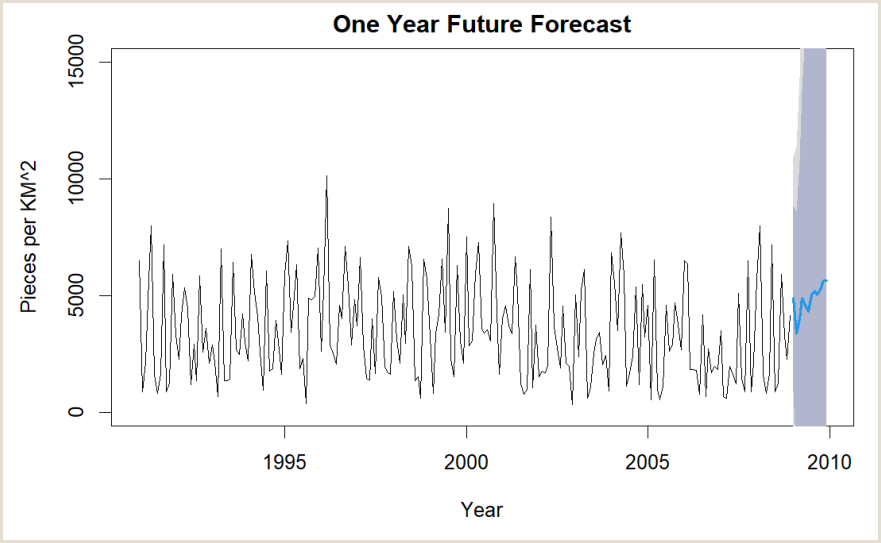


ARIMA MODEL

Candidate for Prediction

- ARIMA model can be adjusted for seasonality if need be, current data suggests there was no significant seasonal trend
- Forecasting suggests an increase in plastics found over the next year, additional data could make this model more accurate
- Overlap of model predictions versus actual data proves that a majority of the prediction was correct, just overpredicted on some extremes.





PLAN FOR PRODUCT LAUNCH

PLANNING

Polish model and prepare for larger and more comprehensive inputs

MARKETING

Promote through NOAA and United Nations to suggest global effort

DESIGN

Engineer stations to collect water samples and filter out microplastic concentrations

STRATEGY

Decide on collection frequency and resulting analysis

LAUNCH

Deploy collection units and monitors to ensure continuous function

SUMMARY

The plastics created in 1862 still exist today. Unless incinerated, all plastic the world has generated has not yet fully broken down. Microplastics in the ocean get eaten by numerous fish species and ingested by humans. In fish this can be fatal, and more studies need to be conducted on human health and microplastics.

A larger effort needs to be made to reduce the overall amount of plastic being generated. From family homes to fortune 100 companies, everyone can improve the overall health of the planet by finding alternate sources of packaging and goods.

THANK YOU

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