

Pyrolysis GC-MS characterization of plastic debris from the Northern Gulf of Alaska shorelines.

Supporting Information.

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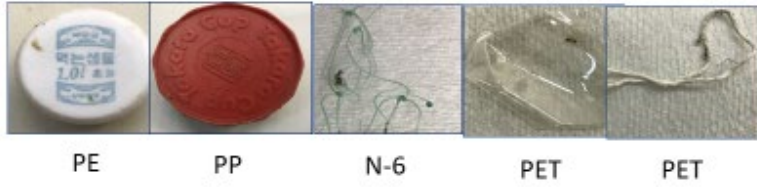
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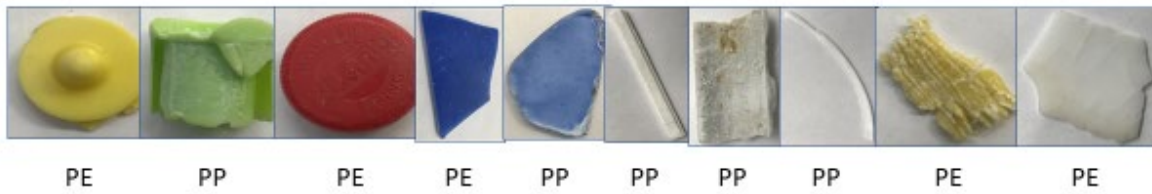
Figure S1. Pyrolysis GC-MS characterization of plastic debris from Katmai National Park (KATM)

Katmai National Park (KATM)

Hallo Bay (Bears on the Beach)

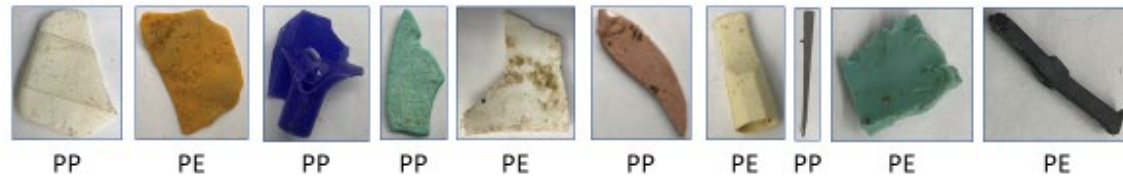


Kukak



Katmai National Park (KATM)

Little Mink Island

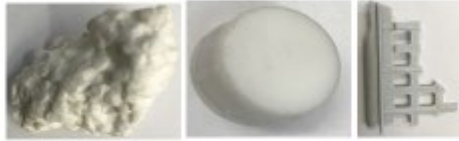


PE/PP

Figure S2. Pyrolysis GC-MS characterization of plastic debris from Kenai Fjords National Park (KEFJ)

Kenai Fjords National Park(KEFJ)

Harris Spit



PS

PE

PP

Verdant Cove



PP

PP

PE

Nuka Bay



PP

PP

PP

Kenai Fjords National Park (KEFJ)

McArthur Pass



PP

PVC/BFR

PE

PE

PP

PP

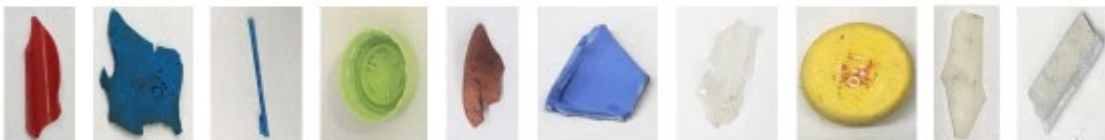
PET

PP

PVC

PE

PP



PP

E/VA

PP

PP

PS

PP

PET

PE

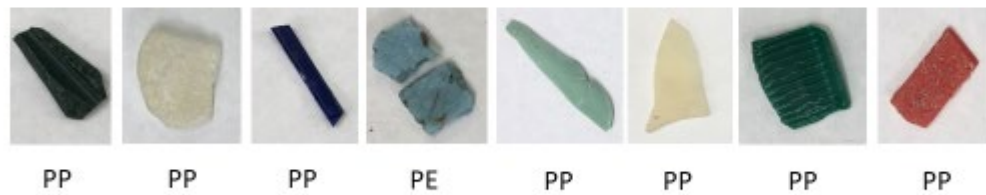
PE

PP

Figure S3. Pyrolysis GC-MS characterization of plastic debris from Kenai Fjords National Park (KEFJ)

Kenai Fjords National Park (KEFJ)

McArthur Pass



Kenai Fjords National Park (KEFJ1)

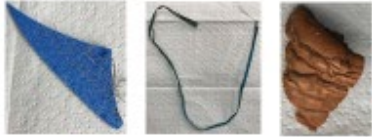
Harris Bay



Figure S4. Pyrolysis GC-MS characterization of plastic debris from Western Prince William Sound (WPWS).

Western Prince William Sound (WPWS)

Herring Bay



PU/PE

PP

PVC/PAN/PU

Johnson



PE

PS

PVC

POM

PS

PP

PP

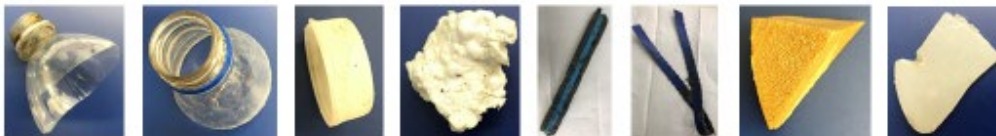
PET

PE

PE

Western Prince William Sound (WPWS)

Near Iktua



PET

PET

PE

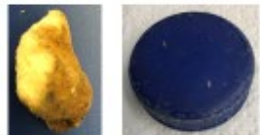
PS

PE

PVC

PVC

PE



PU/HEC

PP

Figure S5. Pyrolysis GC-MS Pyrograms of Commonly Used Plastic Polymers.

HDPE (Standard from Aldrich), Polytetrafluoroethylene (PTFE) (Teflon Boiling Stone from Chemware), Polypropylene (Micropipette tip 100 μ l), Latex Natural Rubber (Rubber band), Polybutyrate (CAB) (Cellulose acetate butyrate sediment core liner), Polysiloxane (Blue cylindrical seal used for tying new GC capillary column ends),

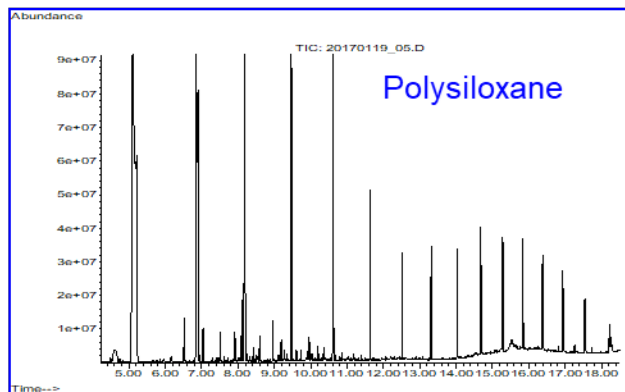
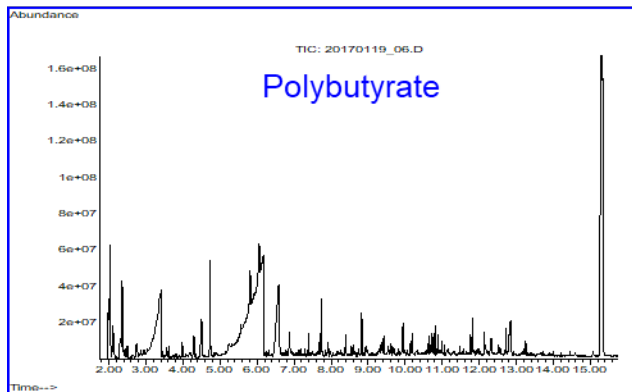
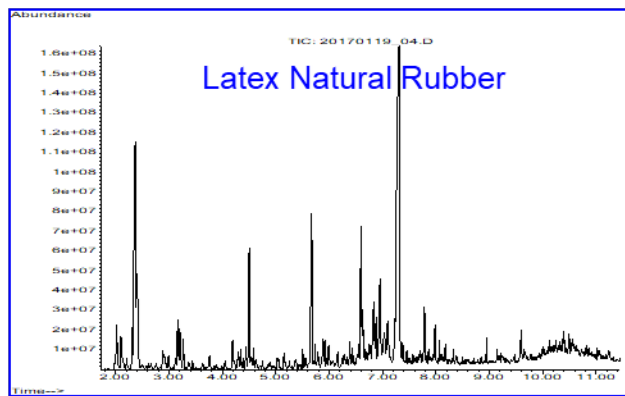
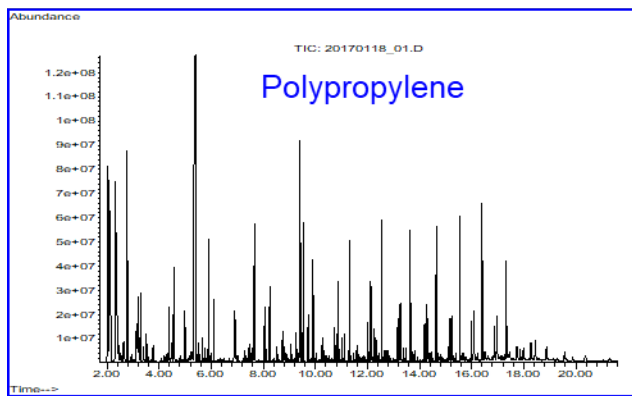
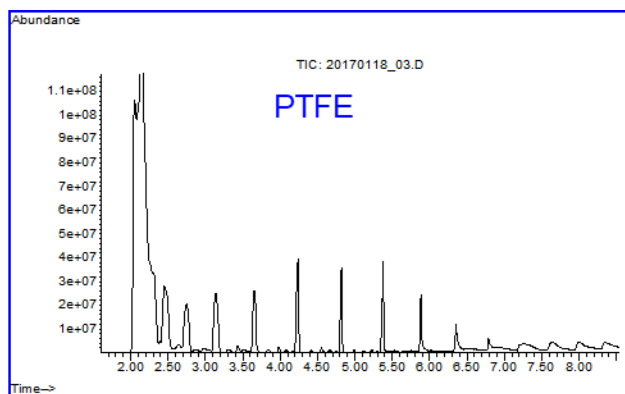
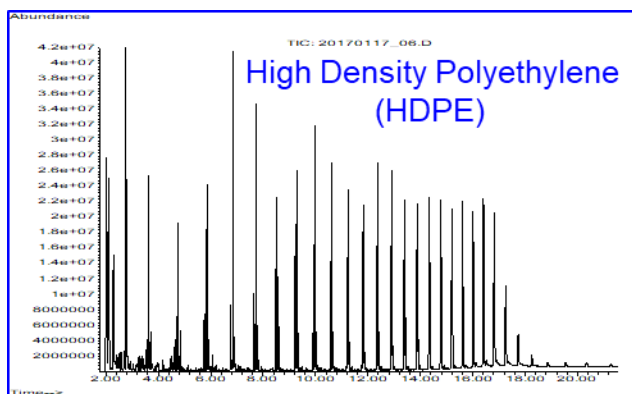


Figure S6. Pyrolysis GC-MS Pyrograms of Commonly Used Plastic Polymers.

Polyester, Polystyrene, PVC, Polyurethane, Nylon-6,6 (Standards from Aldrich), Polycarbonate (Shavings of a Nalgene polycarbonate bottle)

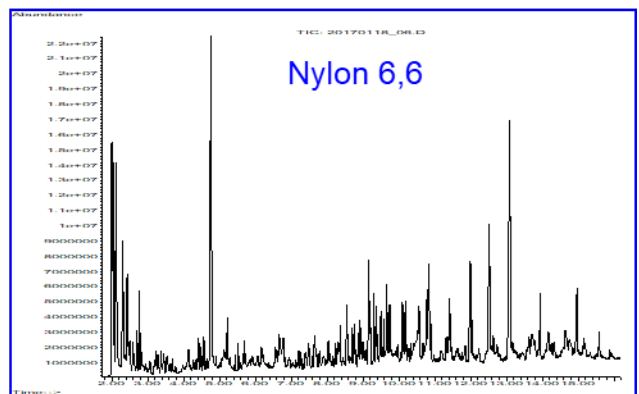
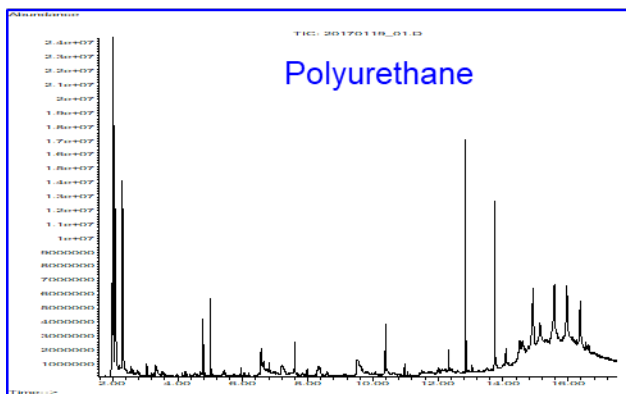
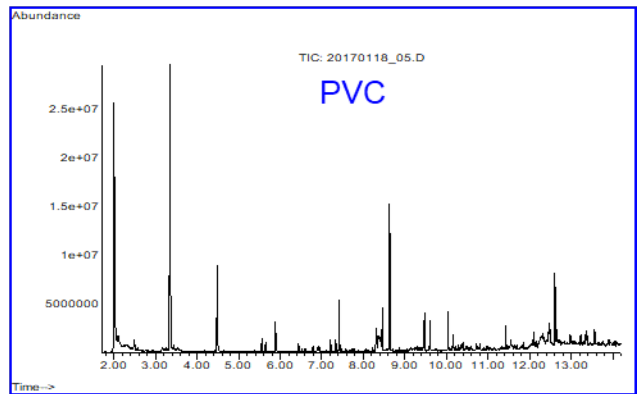
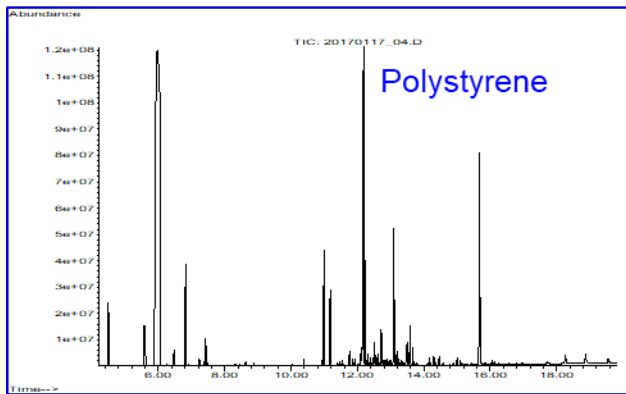
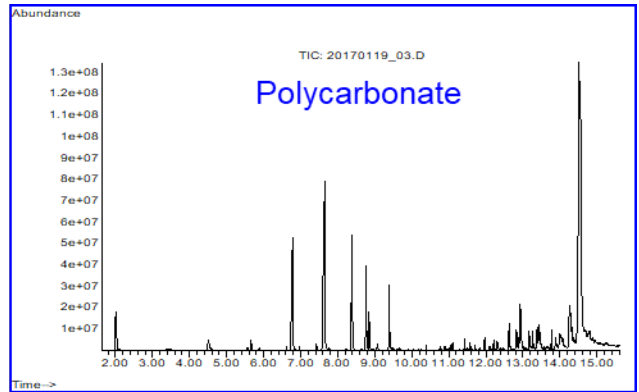
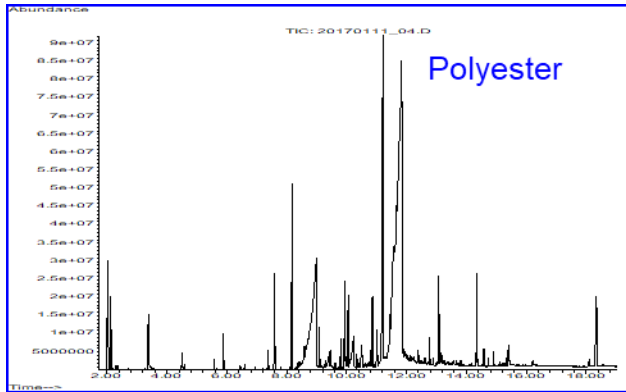


Figure S7. Pyrolysis GC-MS Pyrograms of Commonly Used Plastic Polymers.

Polymethylmethacrylate (PMMA), Sodium Polyacrylate, Polyethylene-Vinyl Acetate (PVA), Polystyrene-Acrylonitrile, (Standards from Aldrich), Acrylonitrile-Butadiene-Styrene (ABS) (ABS sheet from Amazon), Polyoxymethylene (POM) (Shavings of a butane lighter body)

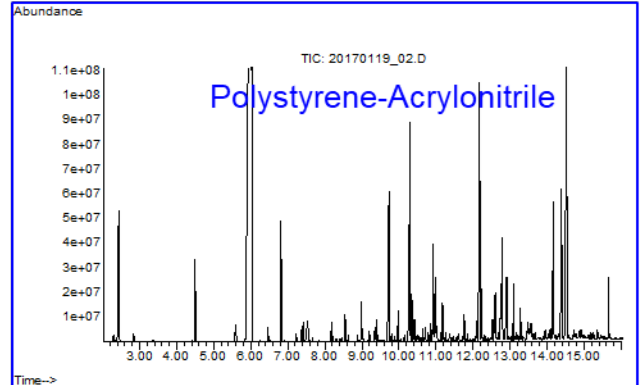
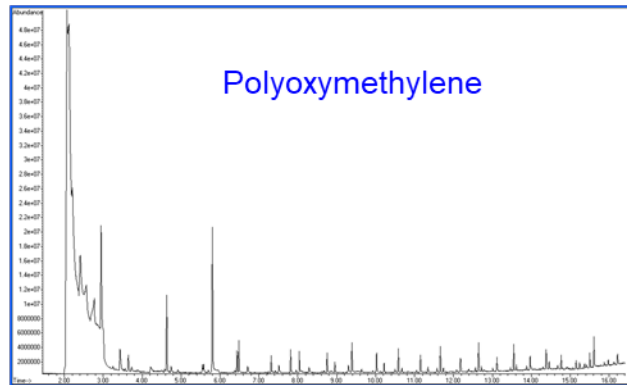
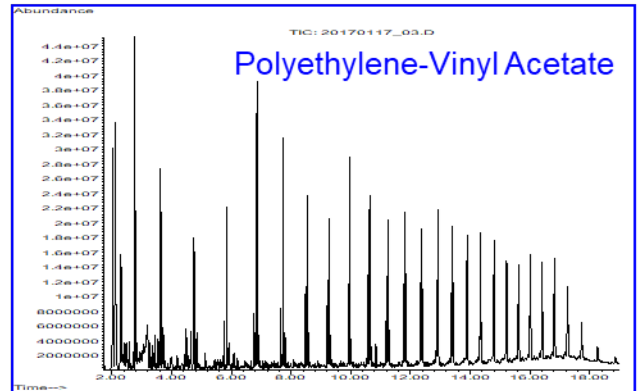
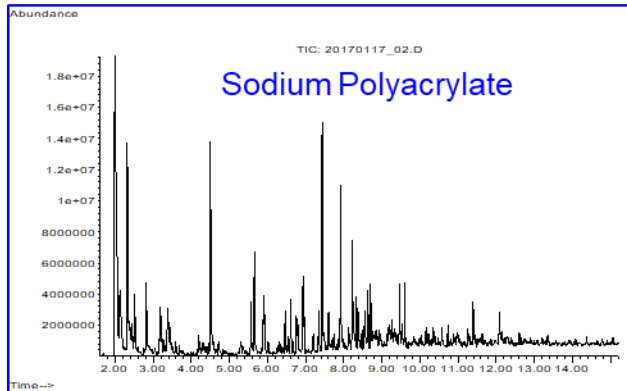
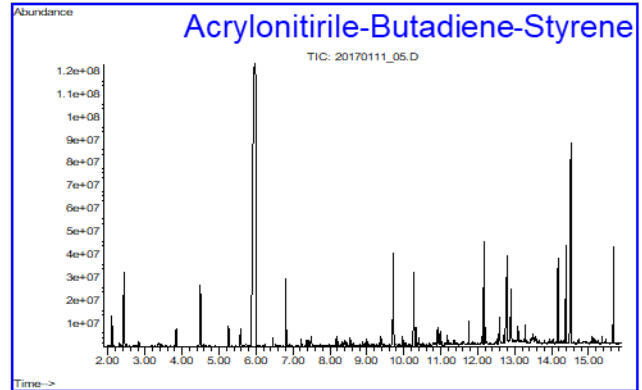
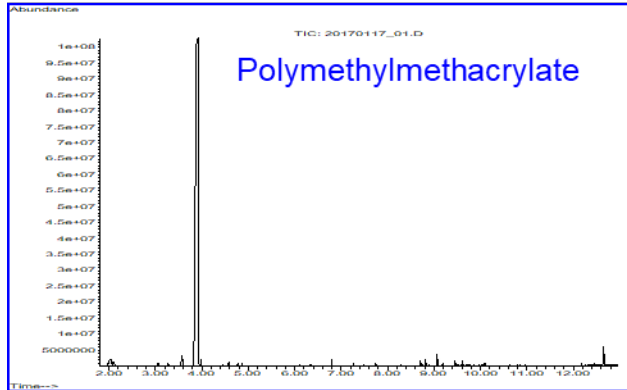
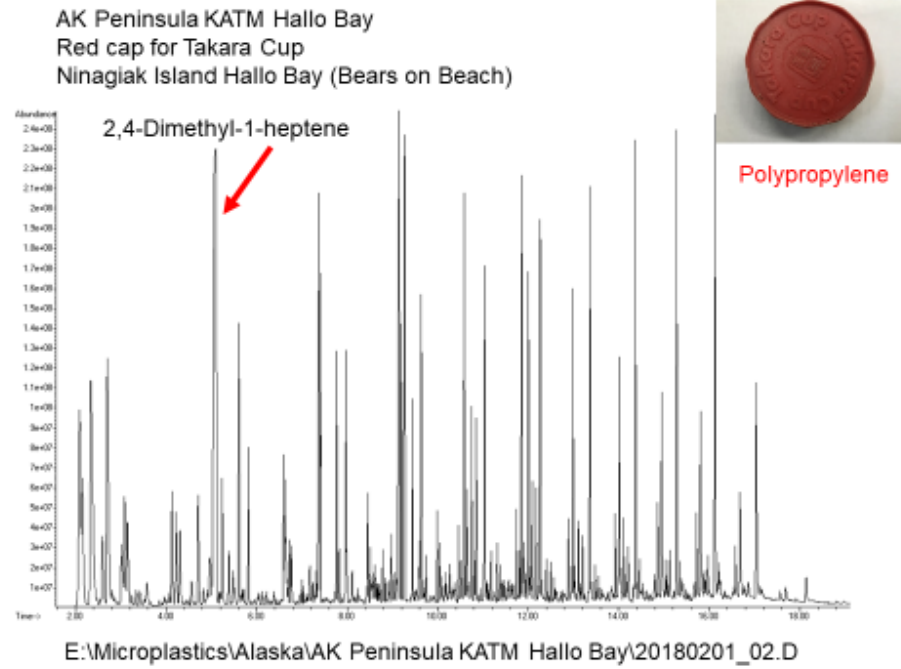


Figure S8. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A



B

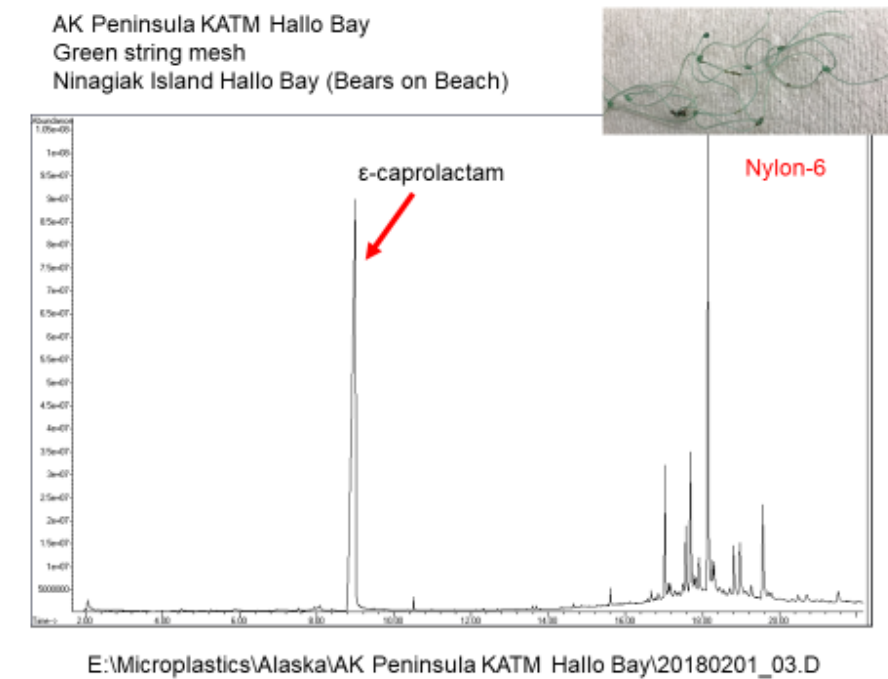
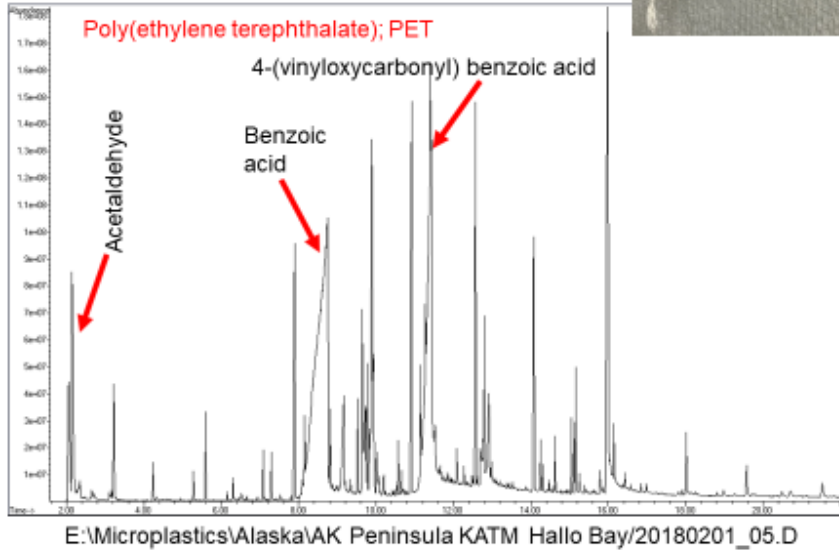


Figure S9. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A

AK Peninsula KATM Hallo Bay
 White string
 Ninagiak Island Hallo Bay (Bears on Beach)



B

Prince William Sound Near Iktua
 White brownish yellow hardened foam

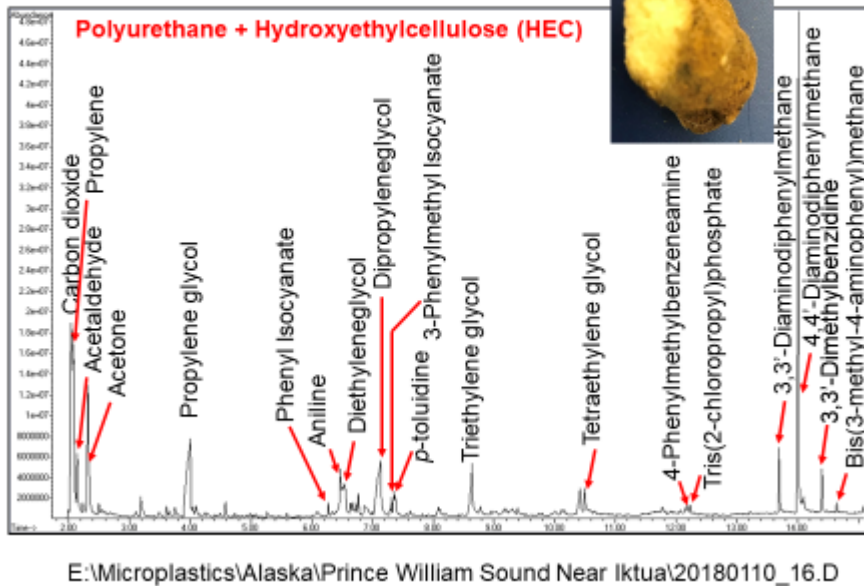
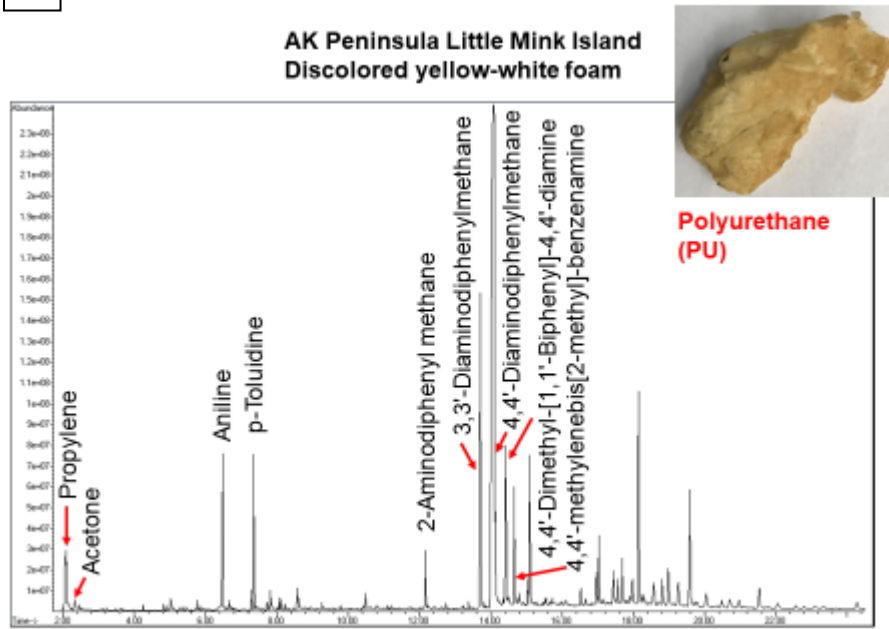


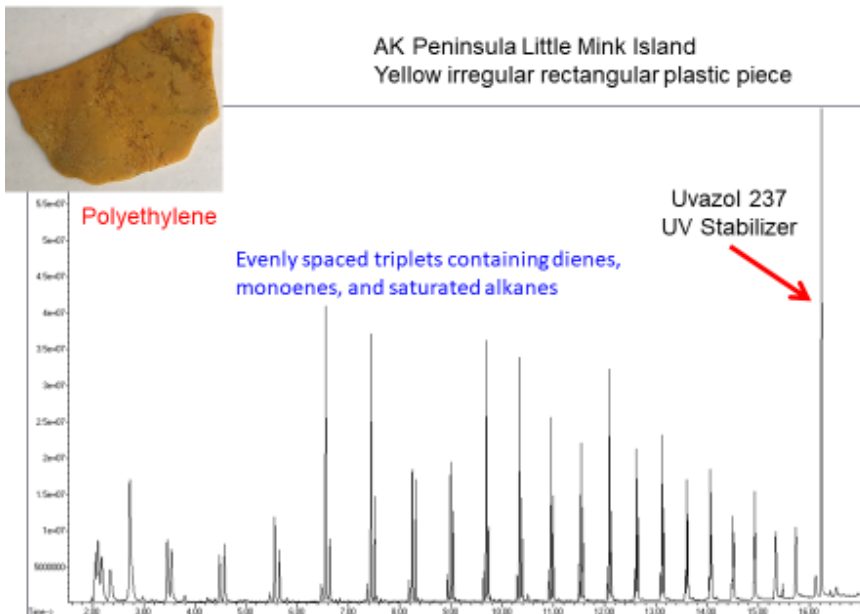
Figure S10. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A



E:\Microplastics\Alaska\AK Peninsula Little Mink Island\20180206_09.D

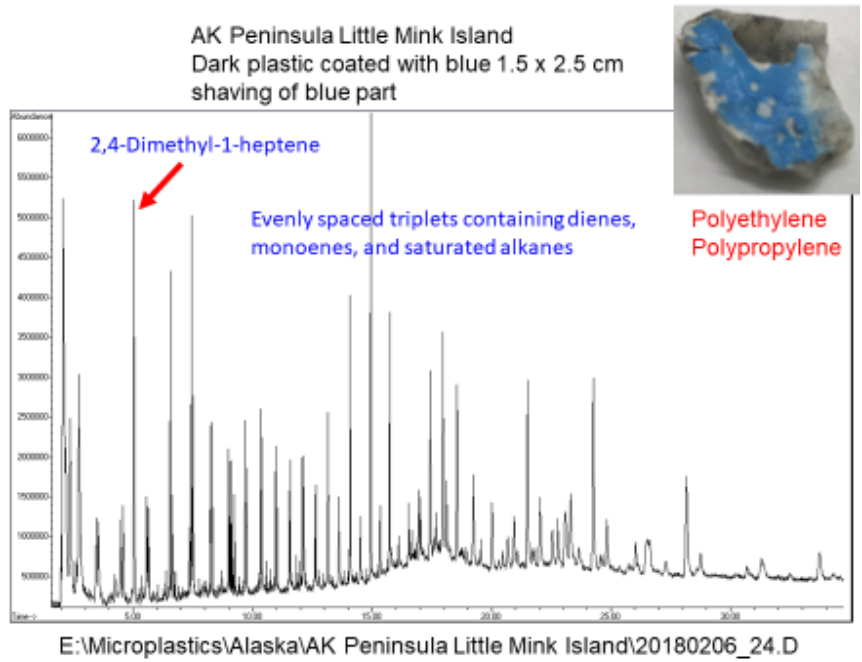
B



E:\Microplastics\Alaska\AK Peninsula Little Mink Island\20180206_13.D

Figure S11. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A



B

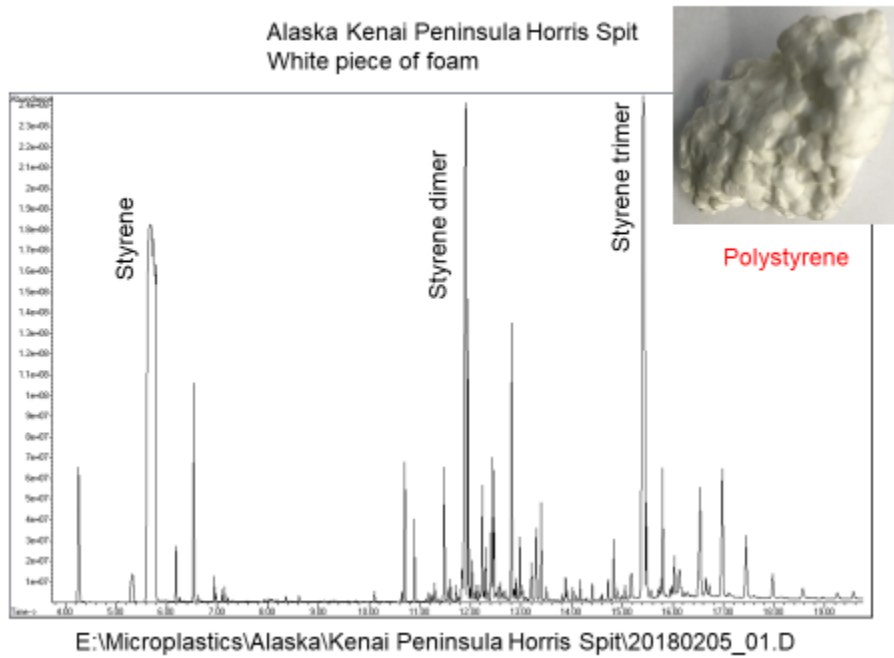


Figure S12. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

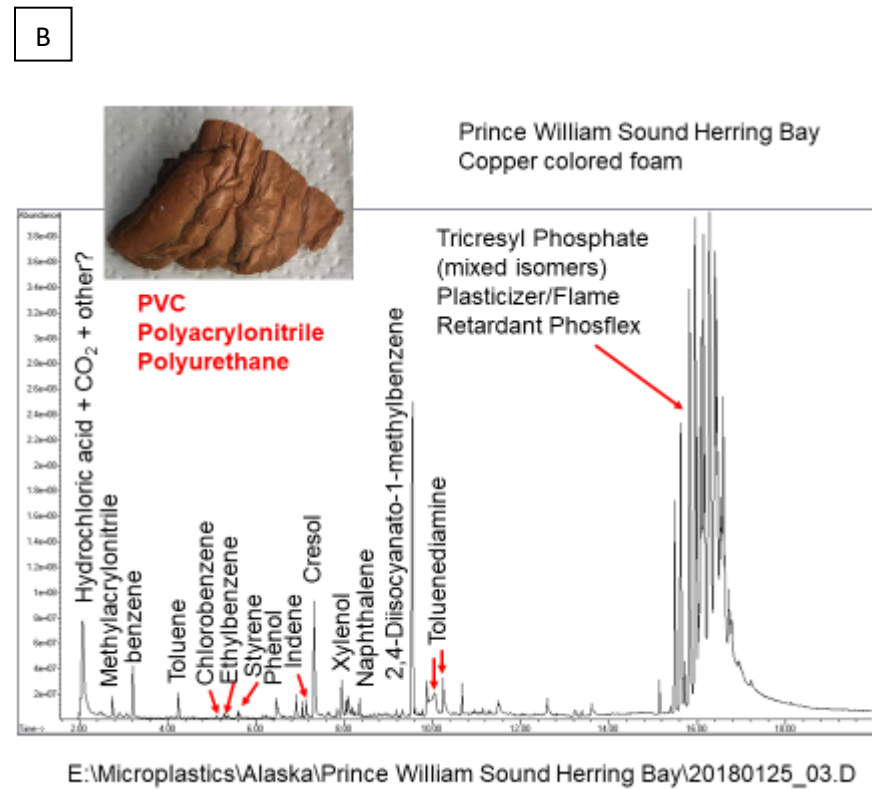
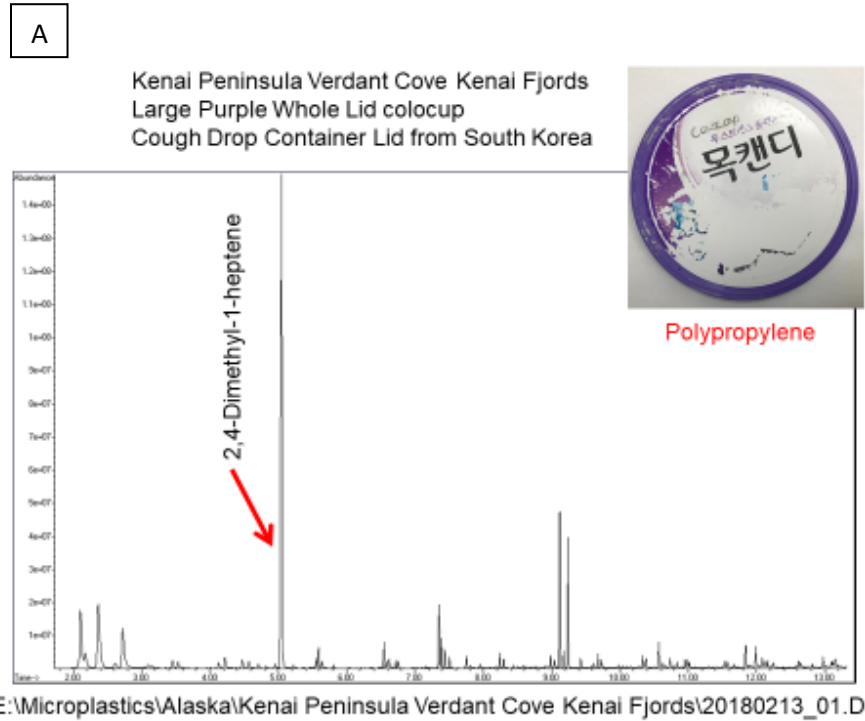
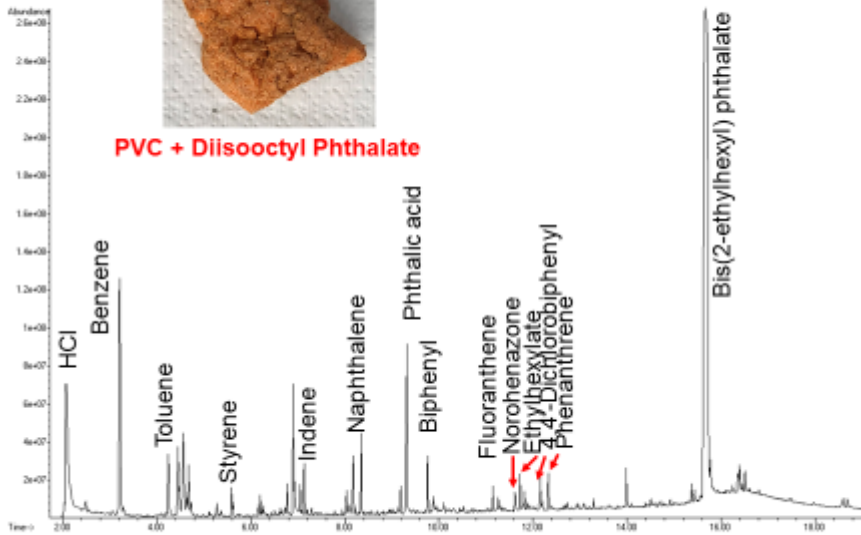


Figure S13. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A



Prince William Sound Johnson
Orange foam

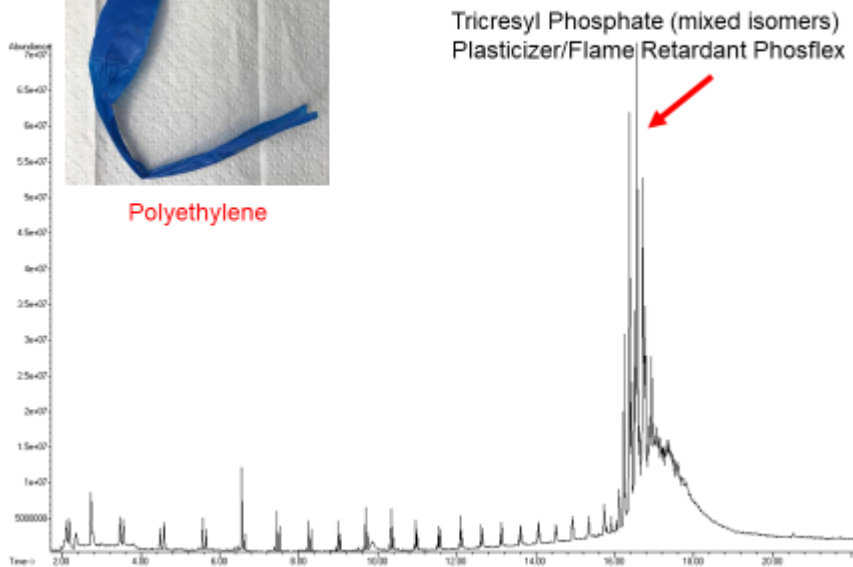


E:\Microplastics\Alaska\Prince William Sound Johnson\20180126_03.D

B



Prince William Sound Johnson
Blue Tape



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Figure S14. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

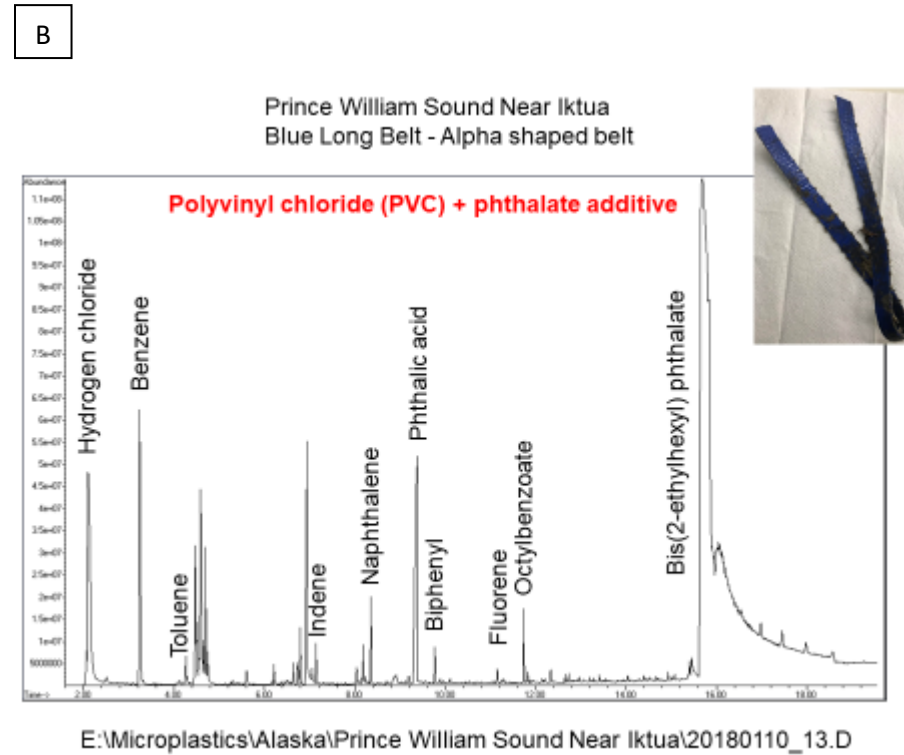
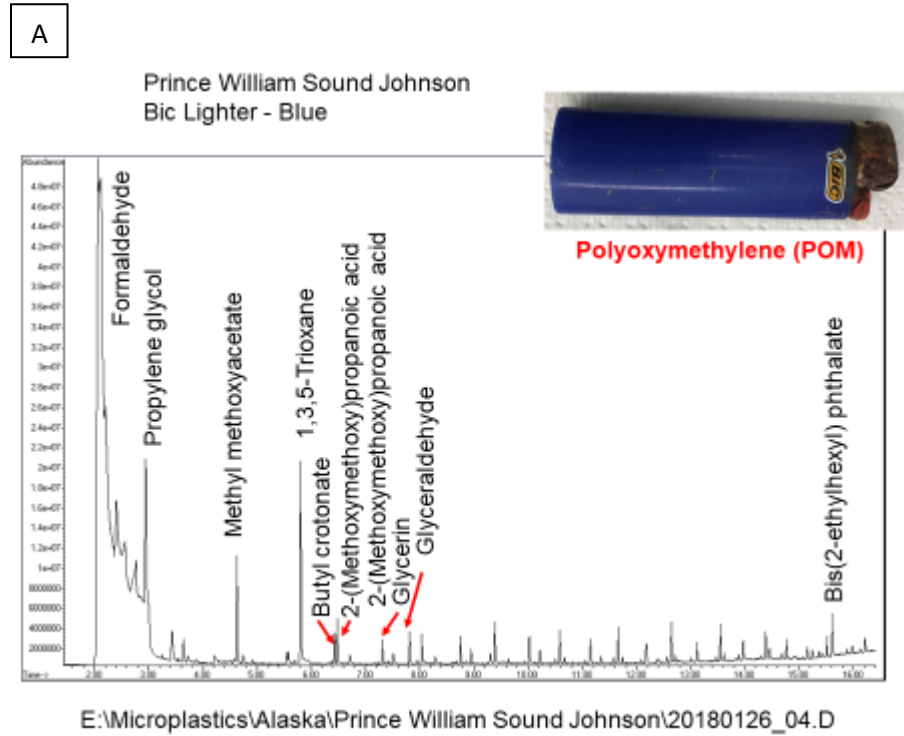


Figure S15. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

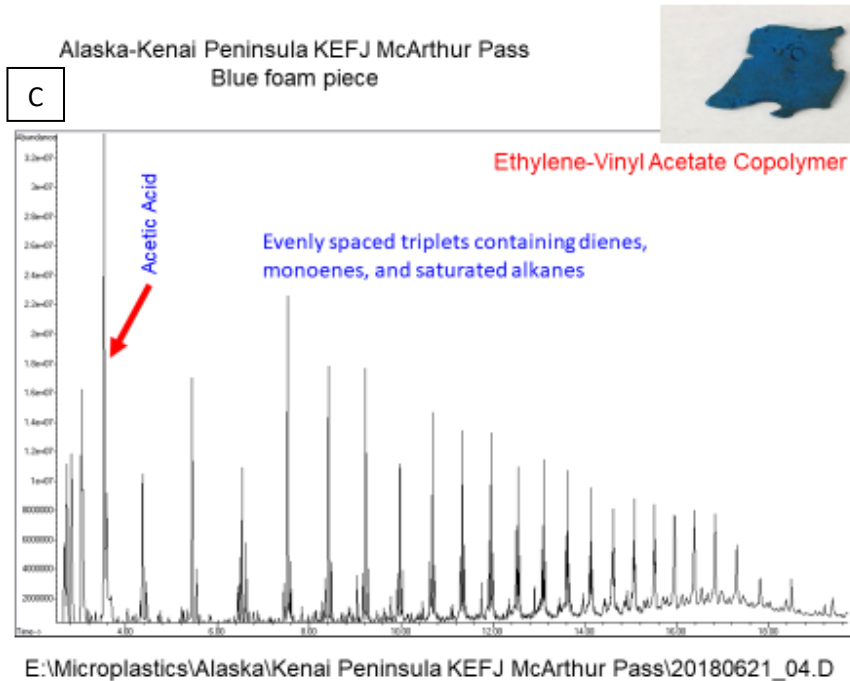
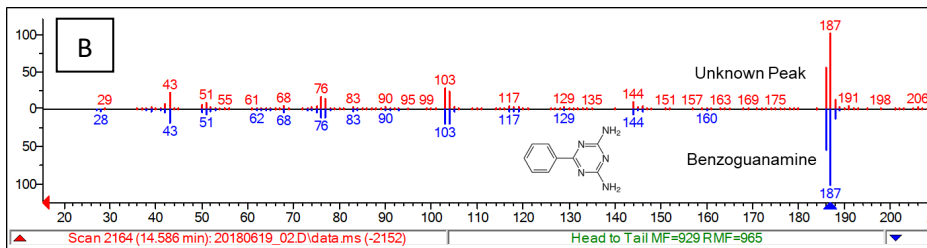
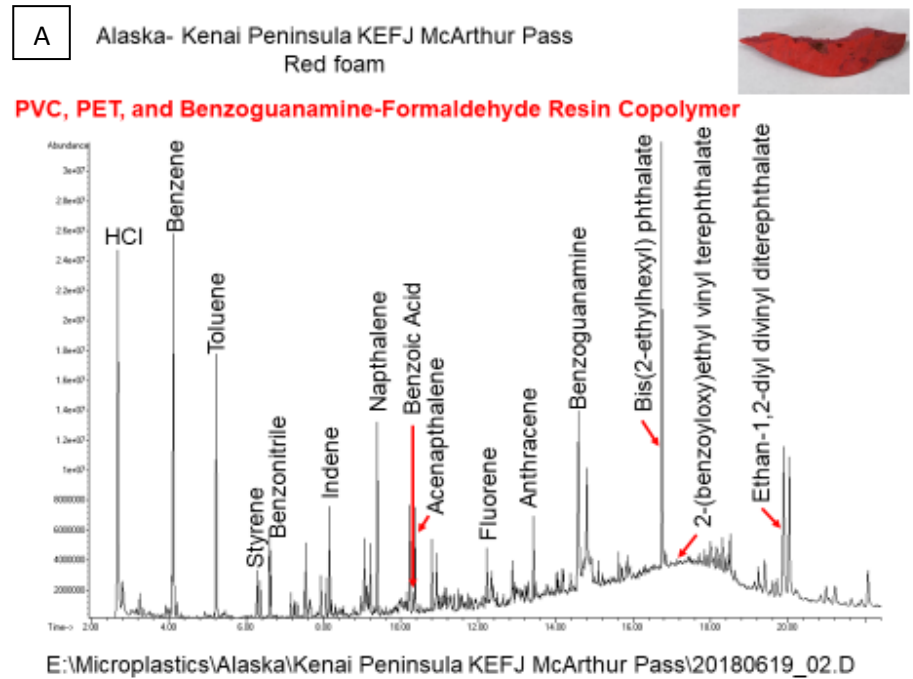
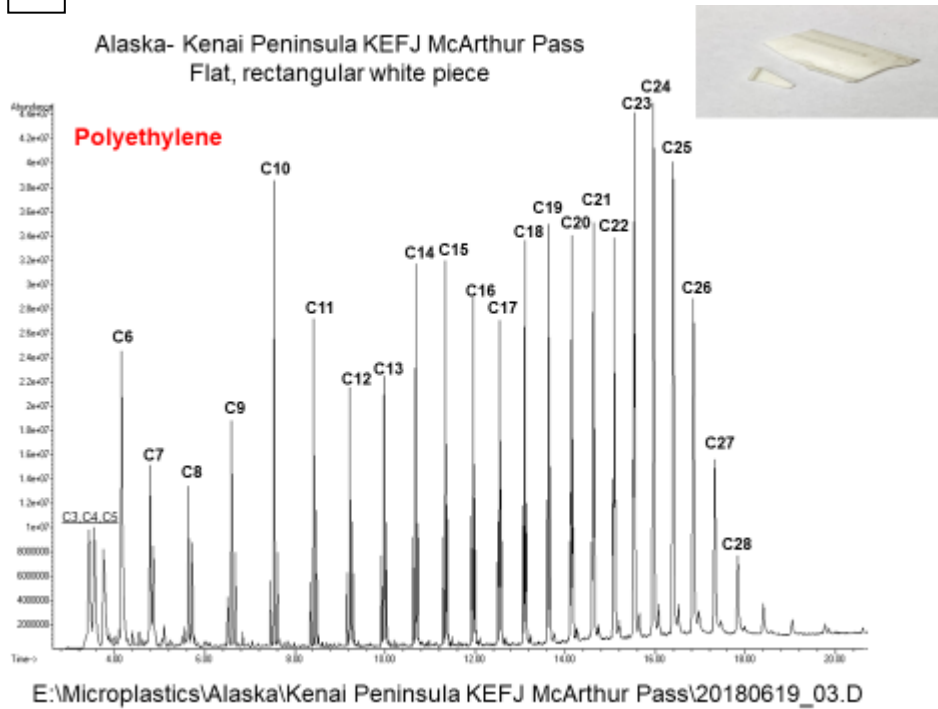


Figure S16. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A



B

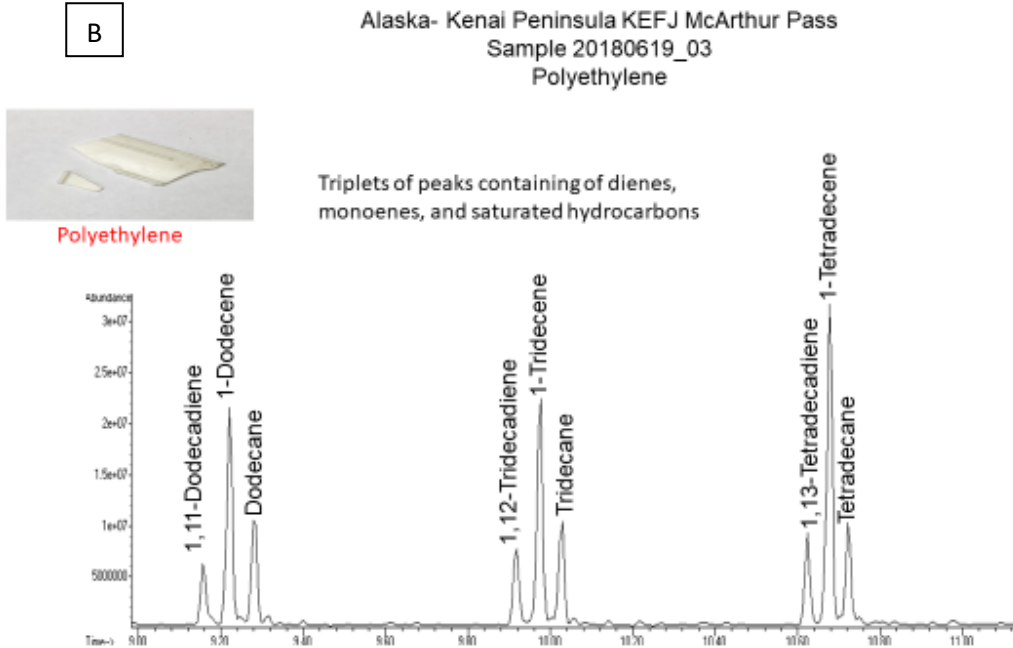
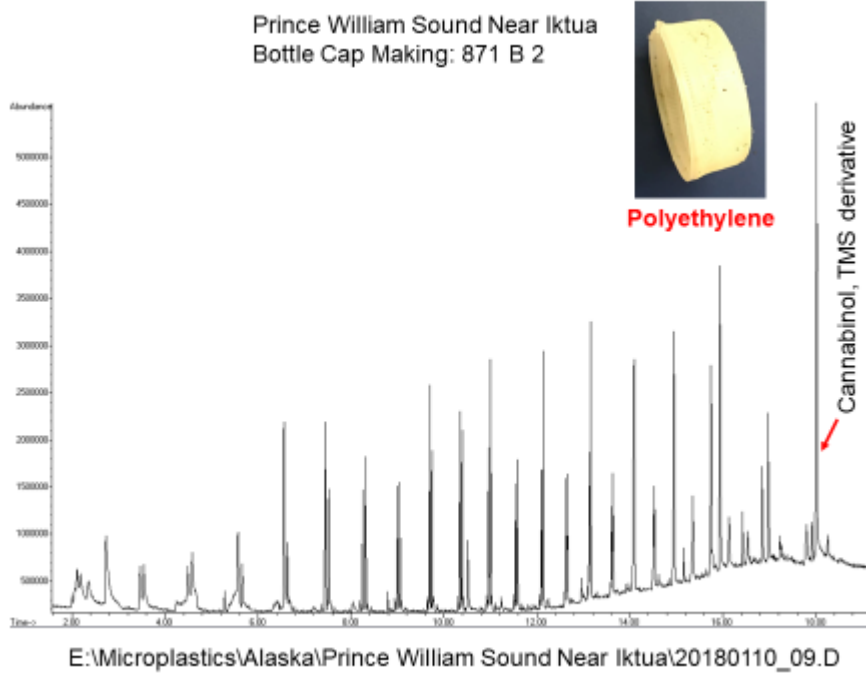


Figure S17. Example pyrograms of plastics from the northern Gulf of Alaska shorelines.

A



B

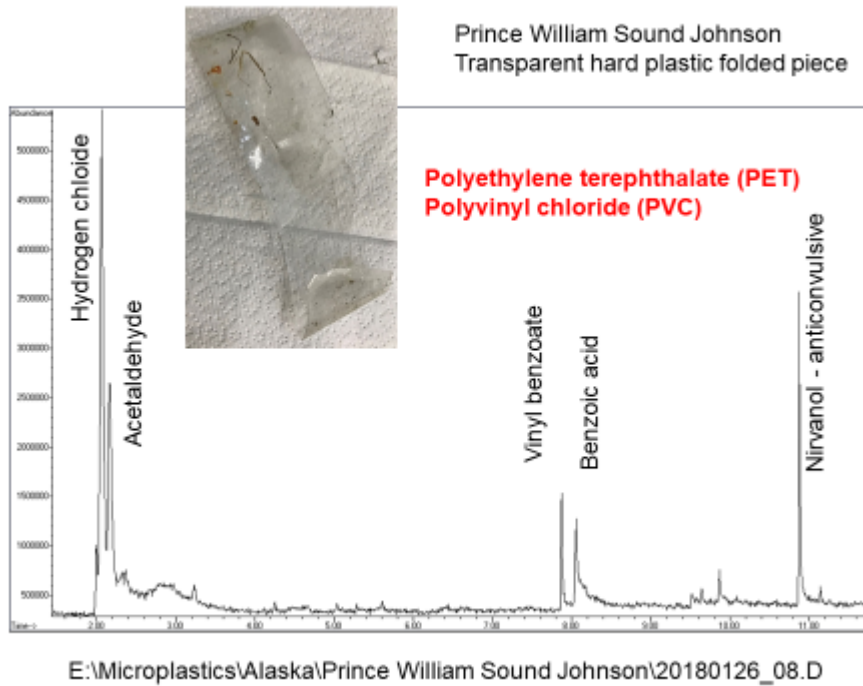


Figure S18. Example pyrogram of plastics from the northern Gulf of Alaska shorelines.

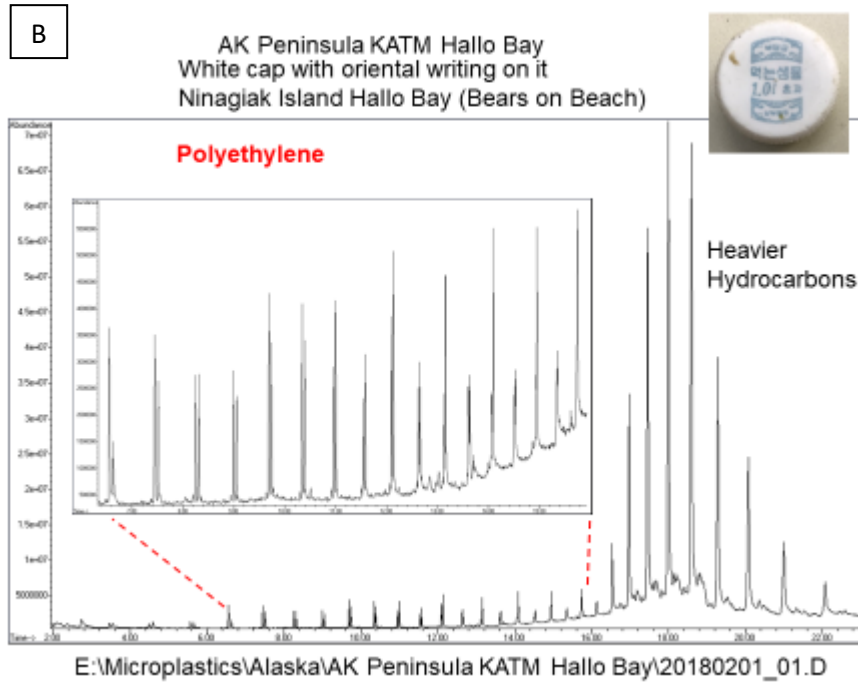
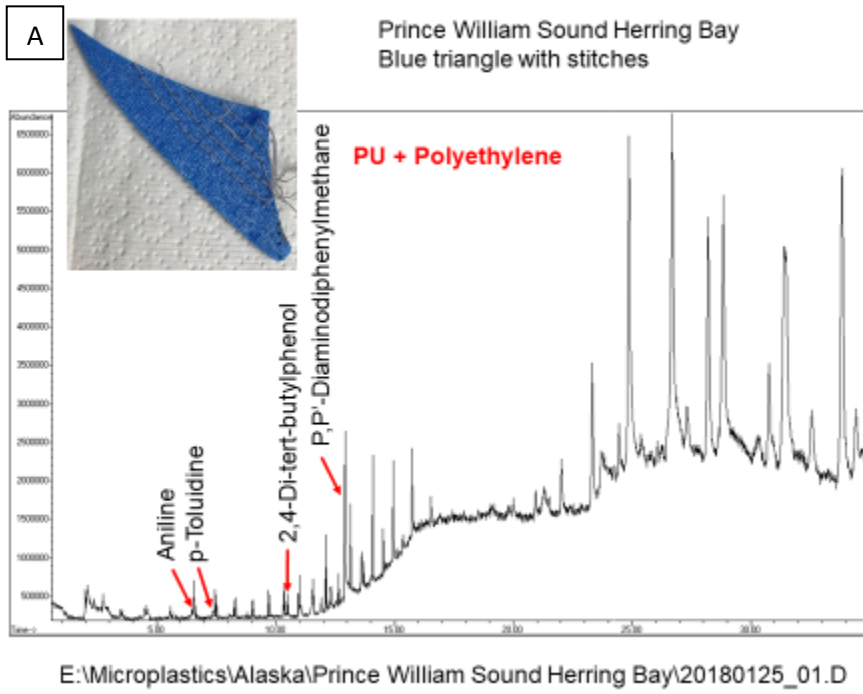


Figure S19. Global production and waste estimates of different plastic polymers in million tons (Geyer et al. 2017¹⁶). PE=Polyethylene; P =Polypropylene; PVC=Polyvinyl Chloride; PET=Polyethylene Terephthalate; PU=Polyurethane; PS=Polystyrene.

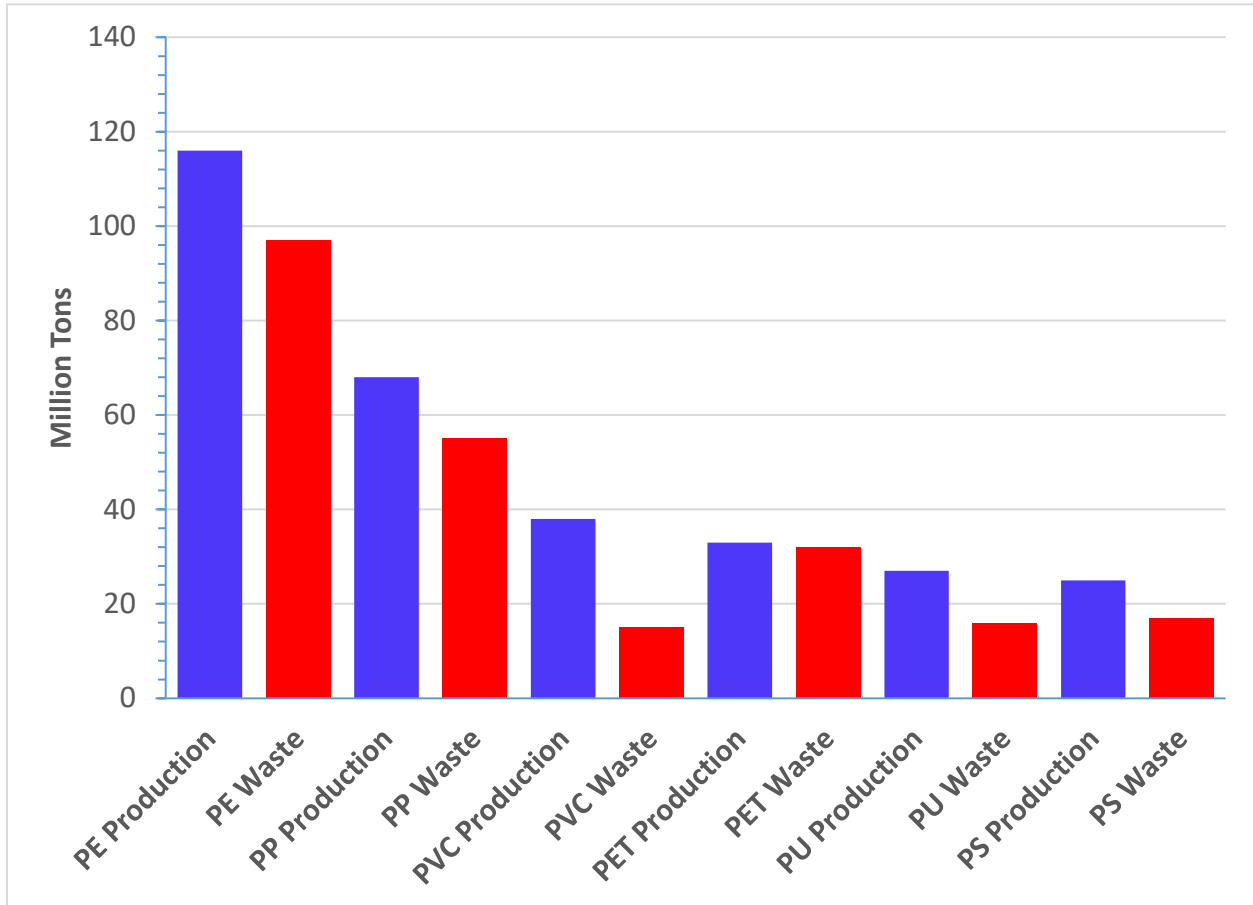


Figure S20. A few examples of the sizes of plastic debris found on the shorelines of the northern Gulf of Alaska



Table S1. Densities of different polymers and seawater

Material	Density
Polyethylene (PE)	0.89–0.98
Polypropylene (PP)	0.85–0.92
Polystyrene (PS)	1.04
Polyamides (PA) Nylons)	1.12–1.15
Polyvinyl Chloride (PVC)	1.38–1.41
Polyurethane (PU)	1.20–1.26
Polyesters like Polyethylene Terephthalate (PET)	1.10–1.40
Polyacrylonitrile (PAN)	1.18
Polyvinyl Acetate (PVA)	1.19
Seawater	1.02