



Hawai'i Wildlife Fund: Marine Debris Keiki Education and Outreach (MDKEO) Program

Education Literature Review – Marine Debris Resources in Hawai'i and Beyond

Available Curricula

- NOAA Marine Debris Program created / funded activities and curricula (grades K-12): <https://marinedebris.noaa.gov/activities-and-curricula#pub-term-36>
- University of Hawai'i at Hilo PRISM (Partnership through Reform in Investigative Science and Math) – “Coral Reefs” curriculum, Lesson 20: Beach Cleanup (grade 4): <https://hilo.hawaii.edu/affiliates/prism/documents/Beachcleanupatalocalbeach6.5.pdf>
- Oikonos Winged Ambassadors: Ocean Literacy Through the Eyes of an Albatross (grades 5-8, with extension for grades 9 – 12): <http://oikonos.org/education/>
- The Smithsonian Institute's Ocean Planet: Pollution Solution lessons (grade 5 – 12): http://smithsonianeducation.org/educators/lesson_plans/ocean/pollution/essay.html
- Oregon SeaGrant's Mitigating Microplastics (grade 6 – 8): <http://seagrant.oregonstate.edu/sqpubs/mitigating-microplastics-teacher-lesson-plans-curriculum>

Other Resources

- Surfrider Foundation Hawai'i's Ocean Friendly Restaurant guide to selecting eco-friendly alternatives to single-use / to-go-ware products: <http://www.oceanfriendlyrestaurantshawaii.org/eco-friendly-alternatives/>
- Kōkua Hawai'i Foundation's Plastic Free Hawai'i website: <https://kokuahawaiifoundation.org/pfh> (see link for “plastic free resources”)
- Zero Waste Kaua'i Education Materials and Links: <http://zerowastekauai.net/educational-information--links.html>

- Recycle Hawai'i Educational Programs: <http://www.recyclehawaii.org/educational-programs.html>
- Plastic Pollution Coalition Resource Guide (including curriculum, videos, fact sheets): <https://plasticpollutioncoalition.zendesk.com/hc/en-us/categories/202673118-Education>
- The Ocean Portal's - Ocean Blog: <https://ocean.si.edu/blog/teaching-your-students-about-marine-debris-classroom-activity>
- The 5 Gyres Institute's:
 - Video on their SEA Change program: <https://youtu.be/Vfx6WSrnlqw>
 - Video on Microbeads: <https://www.youtube.com/watch?v=5QN6IW0K1tw>

Ideas for Teacher / School Funding support:

- Kōkua Hawai'i Foundation's Green Grants for Schools: https://kokuahawaiiifoundation.org/aina/resourcedetail/green_grants_for_schools
- Kōkua Hawai'i Foundation's Fundraising Ideas for Schools: https://kokuahawaiiifoundation.org/aina/resourcedetail/green_fundraising_ideas_for_schools

Selected Peer-reviewed Journal Articles

Available upon direct request to authors, occasionally Google Scholar, and possibly via an email to kahakai.cleanups@gmail.com.

- **Microplastics in beach sand:**
 - Hawaiian archipelago: McDermid, K. J., and T. L. McMullen. 2014. Quantitative analysis of small-plastic debris on beaches in the Hawaiian archipelago. *Marine Pollution Bulletin* 48.7 (2004): 790-794.
 - Hawai'i Island: Carson, H.S., Colbert, S.L., Kaylor, M.J., and K.J. McDermid. 2011. Small plastic debris changes water movement and heat transfer through beach sediments. *Marine Pollution Bulletin* doi: 10.1016/j.marpolbul.2011.05.032
- **Local sources of marine debris:**
 - Maui: Blickley, L.C., Currie, J. J., and G.D. Kaufman. 2016. Trends and drivers of debris accumulation on Maui shorelines: Implications for local mitigation strategies. *Marine Pollution Bulletin* 105 (2016): 292–298.
 - Hawai'i Island: Carson, H.S., Lamson, M.R., Nakashima, D., Toloumu, D., Hafner, J., Maximenko, N. and McDermid, K.J., 2013. Tracking the sources and sinks of local marine debris in Hawai'i. *Marine Environmental Research* 84, pp.76-83.

- **Accumulation studies:**

- North Western Hawaiian Islands “NWHI” (seasonality): Morishige, C., Donohue, M.J., Flint, E., Swenson, C. and Woolaway, C., 2007. Factors affecting marine debris deposition at French Frigate Shoals, northwestern Hawaiian islands marine national monument, 1990–2006. *Marine Pollution Bulletin* 54(8), pp.1162-1169.
- NWHI (accumulation along the shoreline): Dameron, O.J., Parke, M., Albins, M.A. and Brainard, R., 2007. Marine debris accumulation in the Northwestern Hawaiian Islands: An examination of rates and processes. *Marine Pollution Bulletin* 54(4), pp.423-433.
- Pacific Ocean (plastics in the ocean): Moore, C.J., Moore, S.L., Leecaster, M.K. and Weisberg, S.B., 2001. A comparison of plastic and plankton in the North Pacific central gyre. *Marine Pollution Bulletin* 42(12), pp.1297-1300.
- Worldwide (plastics in the ocean): Eriksen, M., Lebreton, L.C., Carson, H.S., Thiel, M., Moore, C.J., Borrorro, J.C., Galgani, F., Ryan, P.G. and Reisser, J., 2014. Plastic pollution in the world's oceans: more than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea. *PLoS one*, 9(12), p.e111913.

- **Foreign sources of marine debris:**

- Pacific Northwest to Hawai'i (crab-pot buoys): Ebbesmeyer, C.C., et al. 2011. Marine debris from the Oregon Dungeness crab fishery recovered in the Northwestern Hawaiian Islands: Identification and oceanic drift paths. *Marine Pollution Bulletin* doi:10.1016/j.marpolbul.2011.09.037
- North Pacific (marine debris trajectories): Maximenko, N., Hafner, J. and Niiler, P., 2012. Pathways of marine debris derived from trajectories of Lagrangian drifters. *Marine Pollution Bulletin*, 65(1), pp.51-62.

- **Ingestion by wildlife:**

- Kaua'i (shearwaters):
 - Fry, D.M., Fefer, S.I. and Sileo, L., 1987. Ingestion of plastic debris by Laysan albatrosses and wedge-tailed shearwaters in the Hawaiian Islands. *Marine Pollution Bulletin* 18(6), pp.339-343.
 - Kain, E.C., Lavers, J.L., Berg, C.J., Raine, A.F., and A. L. Bond. 2016. Plastic ingestion by Newell's (*Puffinus newelli*) and wedge-tailed shearwaters (*Ardenna pacifica*) in Hawaii. *Environ Sci Pollut Res* doi: 10.1007/s11356-016-7613-1

- **Derelict fishing gear:**
 - NWHI: Donohue, Mary J., et al. "Derelict fishing gear in the Northwestern Hawaiian Islands: diving surveys and debris removal in 1999 confirm threat to coral reef ecosystems." *Marine Pollution Bulletin* 42.12 (2001): 1301-1312.

- **Hitchhikers or “aquatic invasive species:**
 - North Pacific: Carson, H.S., Nerheim, M.S., K.A. Carroll, and M. Eriksen. 2013. The plastic-associated microorganisms of the North Pacific Gyre. *Marine Pollution Bulletin* 75 (2013) 126–132.

- **Other marine debris research in Hawai‘i:**
 - Kaua‘i (degradation processes): Cooper, D.A. and P.L. Corcoran. 2010. Effects of mechanical and chemical processes on the degradation of plastic beach debris on the island of Kauai, Hawaii - *Marine Pollution Bulletin* 60: 650–654.
 - Hawai‘i (plastiglomerates): Corcoran, P., Moore, C.J., and K. Jazvac. 2014. An anthropogenic marker horizon in the future rock record. *GSA Today* 24 (6) doi: 10.1130/GSAT-G198A.1.

Have any questions? Please don't hesitate to contact us at marine.debris.KEO@gmail.com or check out our website for more resources / opportunities at <http://wildhawaii.org/>.