

Literature Review: Potential Effects of Fireworks

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Agenda

1. Introduction
2. Potential Effects Overview
3. Alternative Options and Mitigative Measures
4. Summary

Introduction

The Scope

- Dillon Conducted a literature review of documented effects of fireworks
 - Peer-reviewed journal articles (recent research within 15 years)
- Five topics were reoccurring themes in the research
 - Domestic Animals
 - Wildlife
 - Environmental effects
 - Human Health
 - Mitigative measures and alternative options

Potential Effects

Topic	Potential Effects
Companion/Domestic Animals	<ul style="list-style-type: none">• Surveys of animal owners (cat, dog, horse) show that animals react negatively to fireworks (cowering, anxiety, agitation, etc.)• Behaviour reactions can lead to injury and even death
Wildlife	<ul style="list-style-type: none">• Mammals show signs of anxiousness or nervousness• Negative effects on birds, including increased flight activity and altitude, as well as increased heart rate and body temperature• Disruptions to wildlife can lead to physiological stress, impacts to breeding, and mass mortality events
Environment	<ul style="list-style-type: none">• Fireworks release a range of pollutants which can bioaccumulate in the environment• Fireworks directly contribute to anthropogenic wildfire and urban fire ignitions, affecting the economy, environment, and human health
Human Health	<ul style="list-style-type: none">• Human health affects can be indirect (from pollutants) or direct (burns, hearing loss, post-traumatic stress disorder [PTSD])

Suggested Alternatives & Mitigative Measures

Alternatives (Substitutes) for Traditional Fireworks

- Pyrotechnic displays
 - Minimizes the noise impact of traditional firework displays
- Low-noise displays
 - New technologies in firework manufacturing
- “Green” fireworks
 - Reduce ambient PM_{2.5} (Particulate Matter in microns) by ~50% compared to traditional fireworks
 - Still a source of similar pollutant level for other pollutants
- Drone Light shows
 - Eliminates pollution and noise,
 - Are sustainable, less dangerous, and reusable
 - Have documented negative interactions with wildlife

Suggested Alternatives & Mitigative Measures

While alternatives, such as drone light shows, are growing in popularity, it is evident that some people still prefer traditional firework displays.

- Continued sales and purchasing of fireworks
- Demand and attendance of large firework displays

Why?

- Cultural?
- Habitual?
- Nostalgia?

Mitigation

- To protect wildlife, some places have implemented a ban on fireworks
- Restrict total number of fireworks used overall
- Control of sales

Summary

- Fireworks have a long history of cultural importance, but recently, the potential effects have become a relevant discussion
- The Literature Review found multiple documented effects of fireworks on animals, the environment, and human health
- Mitigation measures, including control of sales, banning fireworks, and use of alternatives have shown to reduce the impacts of fireworks
- Alternatives can present a more sustainable and economically feasible option, as they:
 - Minimize noise impact
 - Reduce air pollutants
 - Are recyclable for future use (drones)