

Contaminación Lumínica: un nuevo estresor para ambientes marinos costeros

Dr. Cristian Duarte V.
cristian.duarte@unab.cl



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Facultad de Ciencias de la Vida
Departamento de Ecología y Biodiversidad
Universidad Andrés Bello, Chile



Lecimat

Calentamiento global



Acidificación del océano





Contaminación Lumínica

- *Artificial Light at Night (ALAN)*

Contaminación lumínica

Reacción general
contaminación

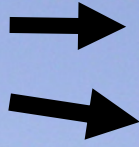


VS

ALAN



ALAN



Astronómico: la luz que afecta la visión del cielo nocturno.

Ecológico: La luz que modifica los patrones naturales de luz y oscuridad.



Fase diurna
(Luz)

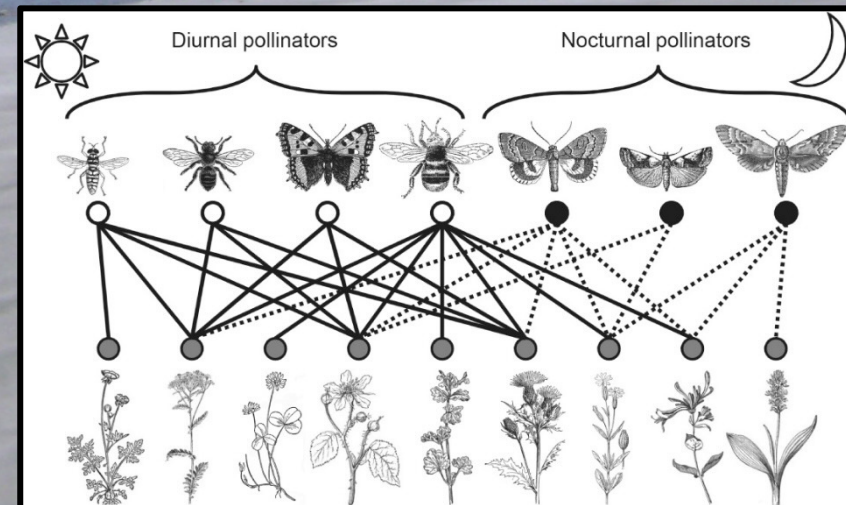
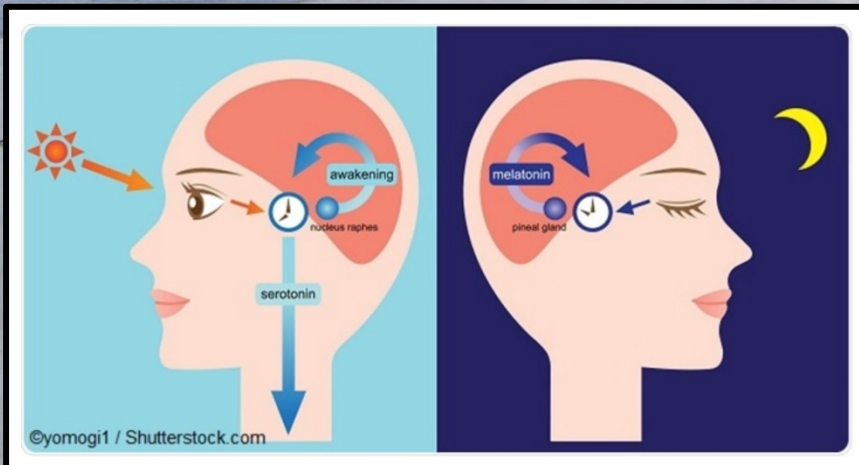
Constante
hace mas de
4.5 millones
de años!!

Fase nocturna
("Oscuridad")



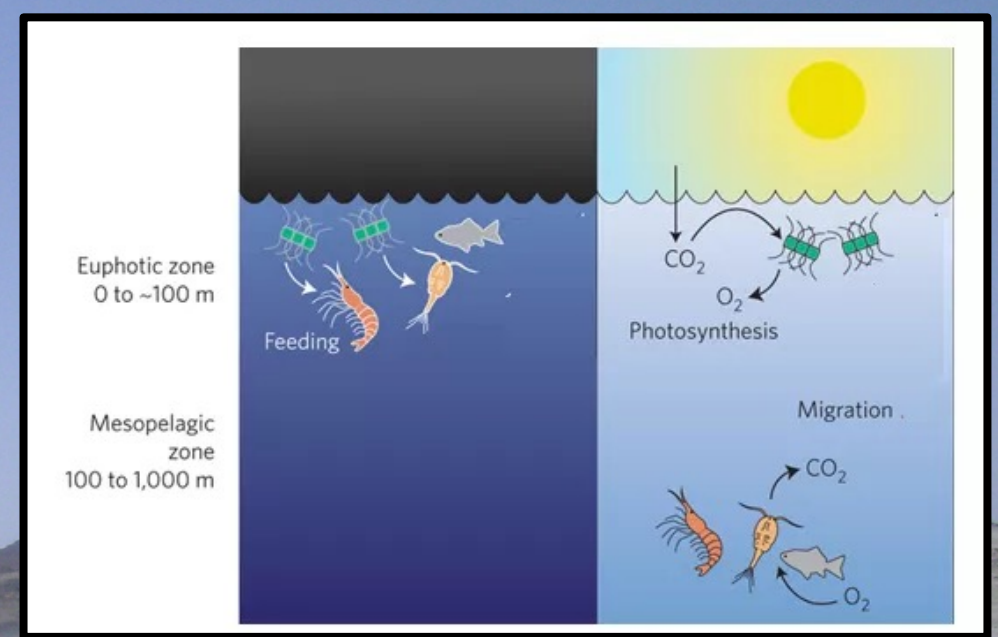
Importancia de los patrones de luz-oscuridad

✓ *Controla el ritmo circadiano*



Ecological Entomology, Volume: 40, Issue: 3, Pages: 187-198, First published: 13 December 2014, DOI: (10.1111/een.12174)

✓ *Influye sobre la migración vertical de organismos marinos.*



✓ *OJO, también la luz natural entrega señales para la orientación de aves.*





A

L

A

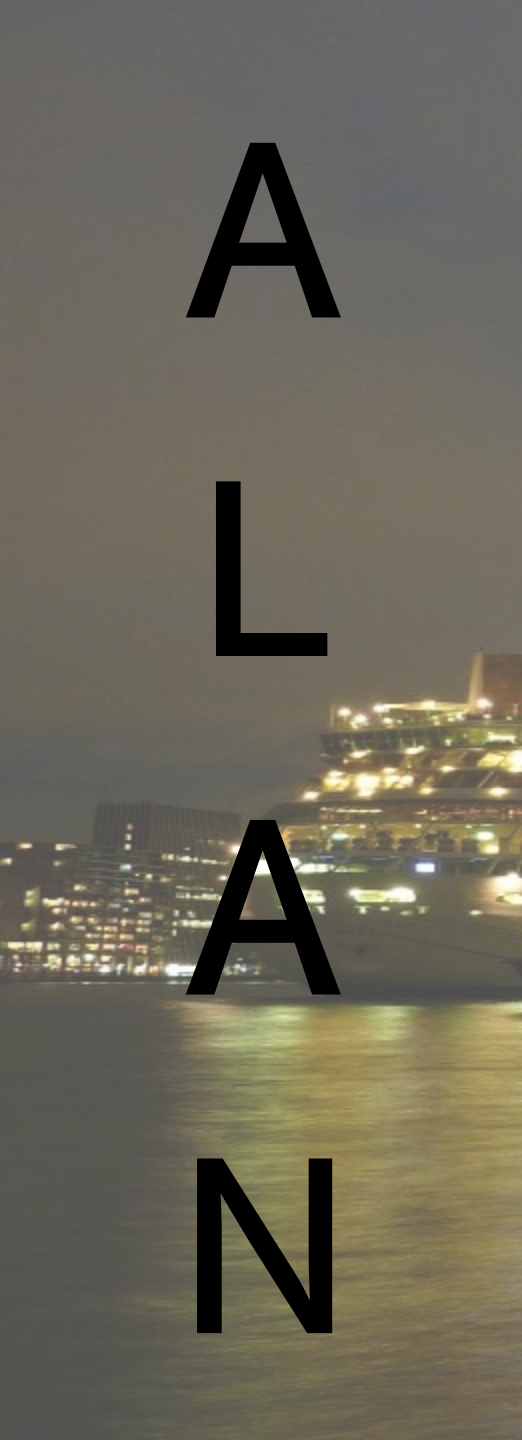
N

1992



2010





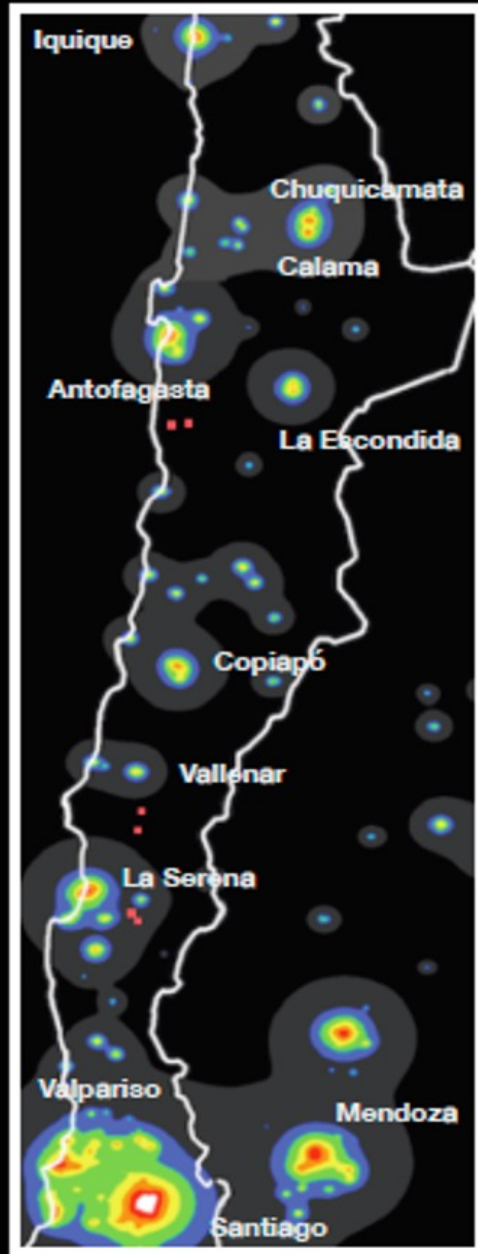
A

L

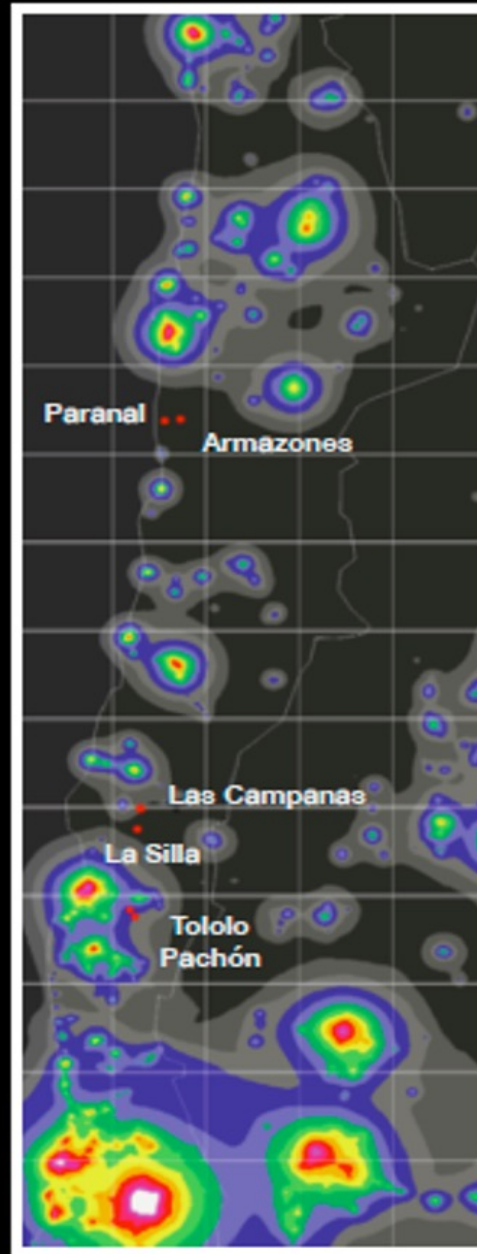
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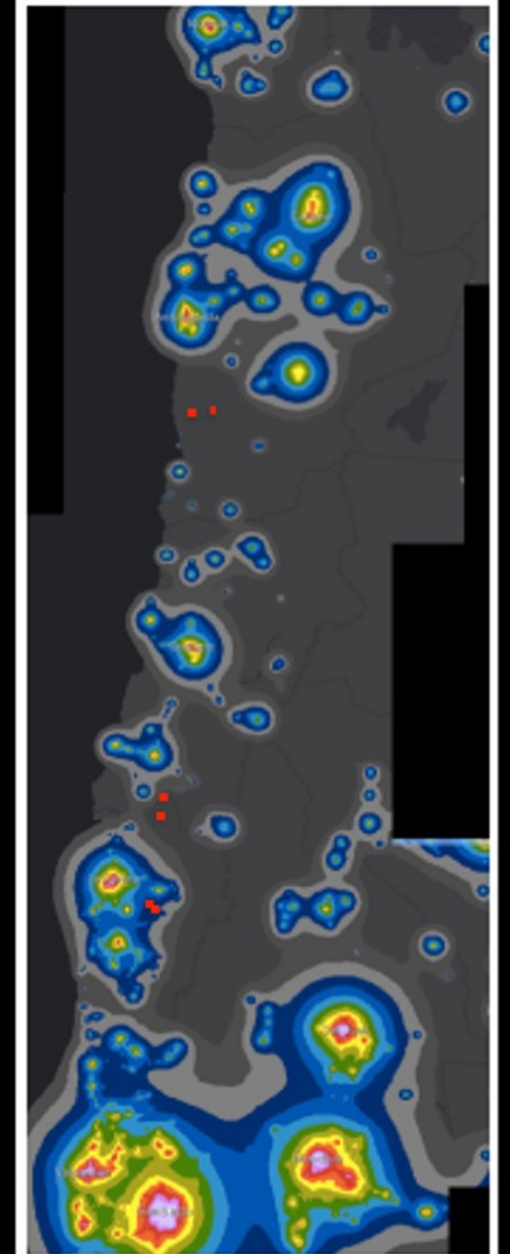
1996



2006



2016



Night Sky Atlas: 1996 by Cinzano et al. 2001; 2006 by David Lorenz; 2016 by Falchi et al. 2016

Un factor clave...



Otro aspecto...

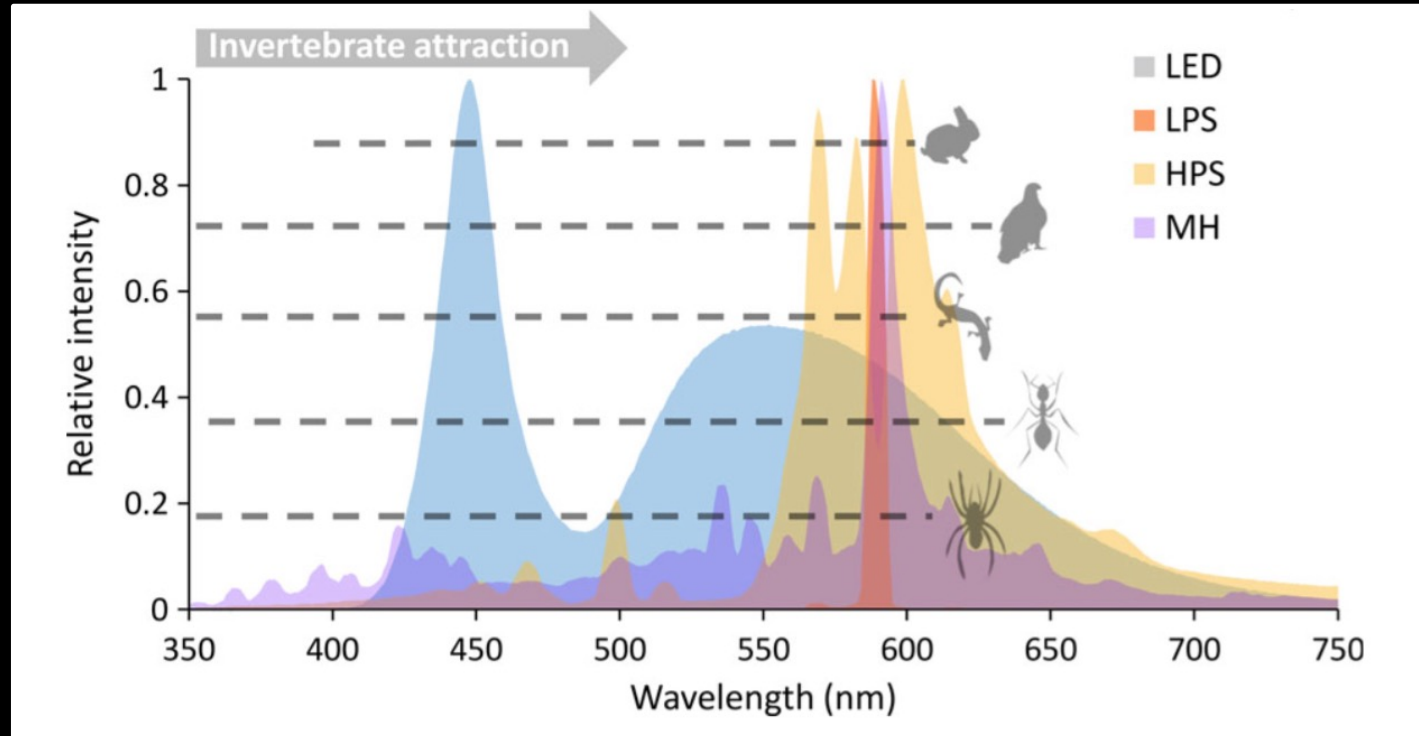
Luz de vapor de sodio de alta presión



Luz LED



Sin embargoiiiiii



¿Por qué estudiar los efectos de ALAN?




Received: 13 April 2017 | Accepted: 21 September 2017

DOI: 10.1111/gcb.13927

OPINION

WILEY **Global Change Biology**

Why artificial light at night should be a focus for global change research in the 21st century

Thomas W. Davies^{1,2}  | Tim Smyth³


GLOBALLY WIDESPREAD

LAG EFFECTS

FEASIBILITY OF SOLUTIONS

EVOLUTIONARY NOVELTY

IMPACTS ON HUMAN HEALTH



ALAN en Ambientes Costeros.



20 % de las costas expuestas a ALAN

Table 1. The spatial extent of coastal light pollution

<i>Region</i>	<i>Kilometers of coastline affected</i>	<i>Percent of coastline affected</i>
Europe	115 383	54.3
Asia (excluding Russia)	113 166	34.2
Africa	18 589	22.1
South America	24 197	15.5
North America	64 356	11.8
Oceania	11 692	7.9
Russia	7377	6.1
Total	354 760	22.2

Notes: Values are derived from a Behrmann equal-area projected Defense Meteorological Satellite Program Operational Line Scan nighttime lights image from 2010 (see Figure 1). Light-polluted areas of coastline were defined as those where the pixel intensity was greater than five on an uncalibrated scale between zero and 63. Antarctica was omitted when calculating the total % of coastline.



ALAN: Antecedentes desde la costa de Chile



ALAN: Antecedentes desde la costa de Chile

Trabajos publicados por el equipo UNAB

 **Marine Pollution Bulletin**
Volume 168, July 2021, 112416

Note

Artificial Light at Night (ALAN) negatively affects the settlement success of two prominent intertidal barnacles in the southeast Pacific

Karen Manríquez ^{a, b}, Pedro A. Quijón ^c, Patricio H. Manríquez ^{d, e}, Cristian Miranda ^a, José Pulgar ^{b, f}, Diego Quintanilla-Ahumada ^a, Cristian Duarte ^{b, f, g}

 **Environmental Pollution**
Volume 280, 1 July 2021, 116895

Effects of artificial light at night and predator cues on foraging and predator avoidance in the keystone inshore mollusc *Concholepas concholepas* ☆

Patricio H. Manríquez ^{a, b, c, d, e, f, g}, María Elisa Jara ^b, Claudio P. González ^{a, b}, Mylene Seguel ^{a, b}, Pedro A. Quijón ^c, Stephen Widdicombe ^d, José M. Pulgar ^e, Diego Quintanilla-Ahumada ^a, Cristóbal Anguita ^f, Cristian Duarte ^{a, g}

 **Environmental Pollution**
Volume 244, January 2019, Pages 361-366


Endogenous cycles, activity patterns and energy expenditure of an intertidal fish is modified by artificial light pollution at night (ALAN) ☆

José Pulgar ^{a, b, c, d, e, f, g}, Danae Zeballos ^a, Juan Vargas ^a, Marcela Aldana ^{b, c}, Patricio H. Manríquez ^{d, e}, Karen Manríquez ^{a, f}, Pedro A. Quijón ^g, Stephen Widdicombe ^h, Cristóbal Anguita ⁱ, Diego Quintanilla ^a, Cristian Duarte ^{a, j}

 **Science of The Total Environment**
Volume 872, 10 May 2023, 162086

Field experimental evidence of sandy beach community changes in response to artificial light at night (ALAN)

Cristian Duarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{a, c, e, g, i, k, m, o, q, s, u, w, y}, Cristóbal Anguita ^{d, f, h, j, l, n, p, r, t, v, x, z}, Eduardo A. Silva-Rodríguez ^{c, f, i, k, m, o, q, s, u, w, y}, Patricio H. Manríquez ^{b, h, j, l, n, p, r, t, v, x, z}, Stephen Widdicombe ^{i, k, m, o, q, s, u, w, y}, José Pulgar ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Miranda ^{a, c, e, g, i, k, m, o, q, s, u, w, y}, Nicole Jahnsen-Guzmán ^{a, c, e, g, i, k, m, o, q, s, u, w, y}, Pedro A. Quijón ^{j, l, n, p, r, t, v, x, z}

 **Science of The Total Environment**
Volume 661, 15 April 2019, Pages 543-552

Artificial light pollution influences behavioral and physiological traits in a keystone predator species, *Concholepas concholepas*

Patricio H. Manríquez ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, María Elisa Jara ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, María Isabel Díaz ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Stephen Widdicombe ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, José Pulgar ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Karen Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

 **Environmental Pollution**
Volume 218, November 2016, Pages 1147-1153

Light pollution reduces activity, food consumption and growth rates in a sandy beach invertebrate ☆

T. Luarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, C.C. Bonta ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, E.A. Silva-Rodríguez ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, P.A. Quijón ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, C. Miranda ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, A.A. Farias ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, C. Duarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

Show more

 **Marine Pollution Bulletin**
Volume 184, November 2022, 114147

Short communication

Hemocyanin as a biological indicator of artificial light at night stress in sandy beach amphipods

K. Devon Lynn ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

 **Marine Pollution Bulletin**
Volume 165, April 2021, 112132

Note

Exposure to artificial light at night (ALAN) alters RNA:DNA ratios in a sandy beach coleopteran insect

D. Quintanilla-Ahumada ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, P.A. Quijón ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, J. Pulgar ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, P.H. Manríquez ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, M. Roberto García-Huidobro ^{f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, C. Duarte ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

 **Marine Pollution Bulletin**
Volume 163, February 2021, 111928

Note

Artificial light at night alters the settlement of acorn barnacles on a man-made habitat in Atlantic Canada

K. Devon Lynn ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Paula Tummon Flynn ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Karen Manríquez ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Patricio H. Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, José Pulgar ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

 **Environmental Pollution**
Volume 248, May 2019, Pages 565-573

Artificial light pollution at night (ALAN) disrupts the distribution and circadian rhythm of a sandy beach isopod ☆

Cristian Duarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristóbal Anguita ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Patricio H. Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Stephen Widdicombe ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, José Pulgar ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Eduardo A. Silva-Rodríguez ^{f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Miranda ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Karen Manríquez ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{j, l, n, p, r, t, v, x, z}

 **Science of The Total Environment**
Volume 780, 1 August 2021, 146568

Artificial light at night alters the activity and feeding behaviour of sandy beach amphipods and pose a threat to their ecological role in Atlantic Canada

K. Devon Lynn ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristóbal Anguita ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Stephen Widdicombe ^{e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, José Pulgar ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Patricio H. Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

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Global Change Biology | WILEY

GCB REVIEW

Impacts of artificial light at night in marine ecosystems—A review

Laura F. B. Marangoni¹ | Thomas Davies² | Tim Smyth³ | Airam Rodríguez^{4,5,6} | Mark Hamann⁷ | Cristian Duarte⁸ | Kellie Pendoley⁹ | Jørgen Berge^{10,11,12} | Elena Maggi¹³ | Oren Levy^{14,15}


Research Article | Published: 21 January 2022

Artificial light at night (ALAN) causes variable dose-responses in a sandy beach isopod

Diego Quintanilla-Ahumada, Pedro A. Quijón, Patricio H. Manríquez, José Pulgar, Manuel R. García-Huidobro, Cristian Miranda, Alfredo Molina, Rodrigo Zuloaga & Cristian Duarte

Environmental Science and Pollution Research 29, 35977–35985 (2022) | Cite this article

242 Accesses | 1 Citations | Metrics

 **Marine Pollution Bulletin**
Volume 193, August 2023, 115190

Artificial Light at Night (ALAN) causes size-dependent effects on intertidal fish decision-making

José Pulgar ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Patricio H. Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Stephen Widdicombe ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Roberto García-Huidobro ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Mauricio Carter ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Marcela Aldana ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

 **Marine Pollution Bulletin**
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Artificial Light at Night (ALAN) causes size-dependent effects on intertidal fish decision-making

José Pulgar ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Patricio H. Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Stephen Widdicombe ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Roberto García-Huidobro ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Mauricio Carter ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Marcela Aldana ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

 **Marine Pollution Bulletin**
Volume 193, August 2023, 115190

Artificial Light at Night (ALAN) causes size-dependent effects on intertidal fish decision-making

José Pulgar ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Patricio H. Manríquez ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Stephen Widdicombe ^{d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Roberto García-Huidobro ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Pedro A. Quijón ^{f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Mauricio Carter ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Marcela Aldana ^{c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Diego Quintanilla-Ahumada ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}, Cristian Duarte ^{a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z}

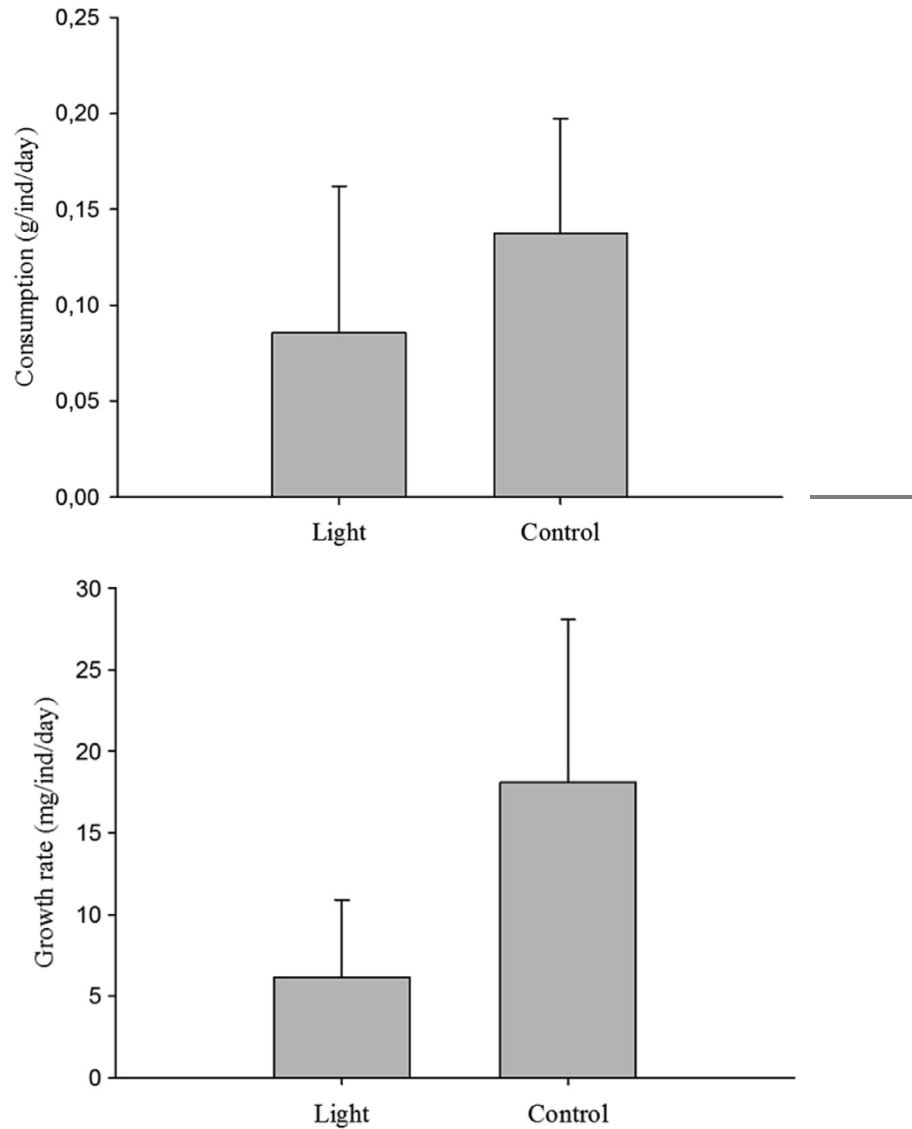
ALAN: Antecedentes desde la costa de Chile



ALAN vs no ALAN

ALAN: Antecedentes desde la costa de Chile

Environmental Pollution 218 (2016) 1147–1153



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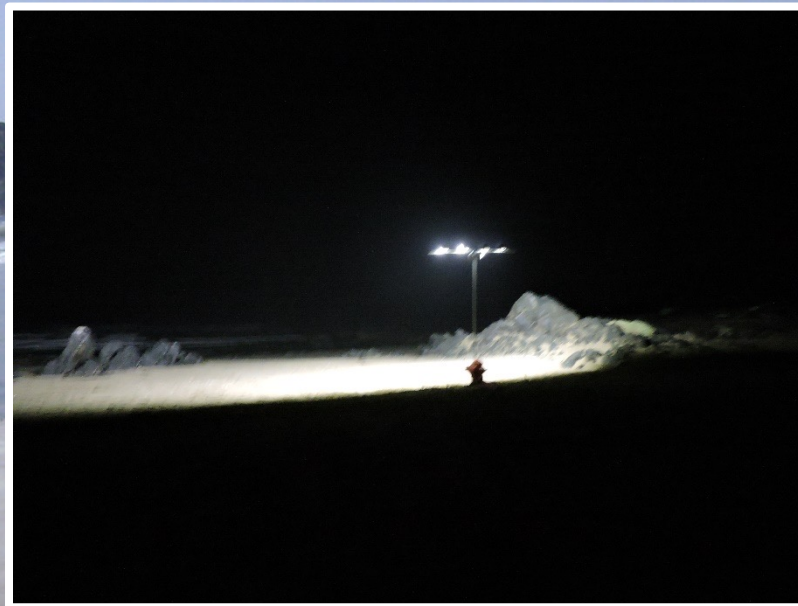
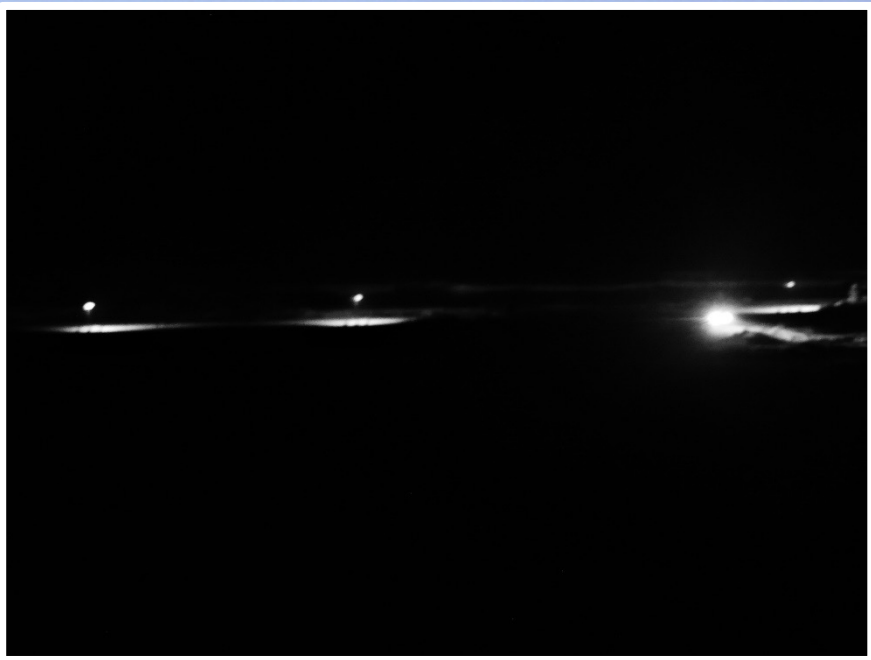
Light pollution reduces activity, food consumption and growth rates in a sandy beach invertebrate[☆]



T. Luarte^a, C.C. Bonta^c, E.A. Silva-Rodriguez^a, P.A. Quijón^d, C. Miranda^a, A.A. Farias^{e, f, g}, C. Duarte^{a, b, *}



ALAN: Antecedentes desde la costa de Chile



ALAN: Antecedentes desde la costa de Chile

Environmental Pollution 248 (2019) 565–573



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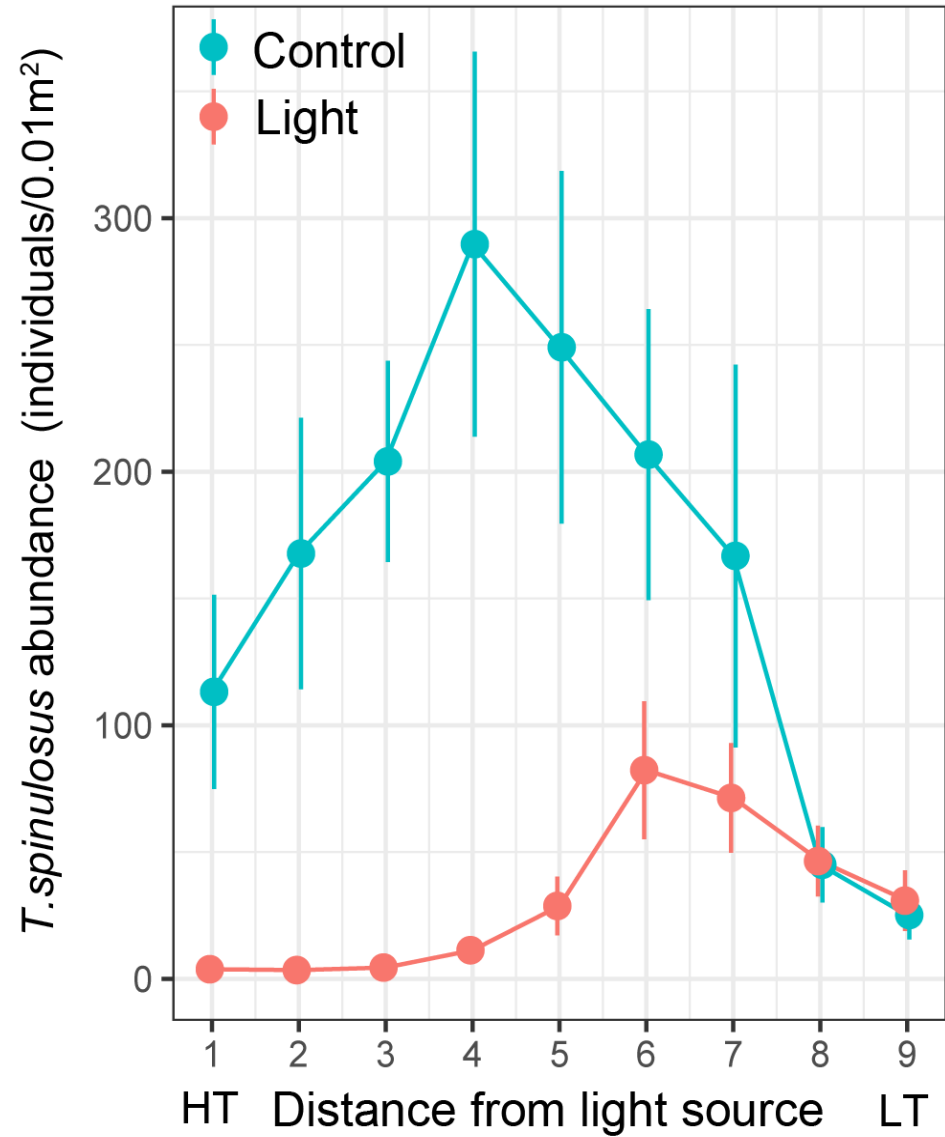
Environmental Pollution

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Artificial light pollution at night (ALAN) disrupts the distribution and circadian rhythm of a sandy beach isopod*

Cristian Duarte ^{a, b, *}, Diego Quintanilla-Ahumada ^a, Cristobal Anguita ^a,
Patricio H. Manríquez ^{c, d}, Stephen Widdicombe ^e, José Pulgar ^a,
Eduardo A. Silva-Rodríguez ^f, Cristian Miranda ^g, Karen Manríquez ^h, Pedro A. Quijón ⁱ



ALAN: Antecedentes desde la costa de Chile

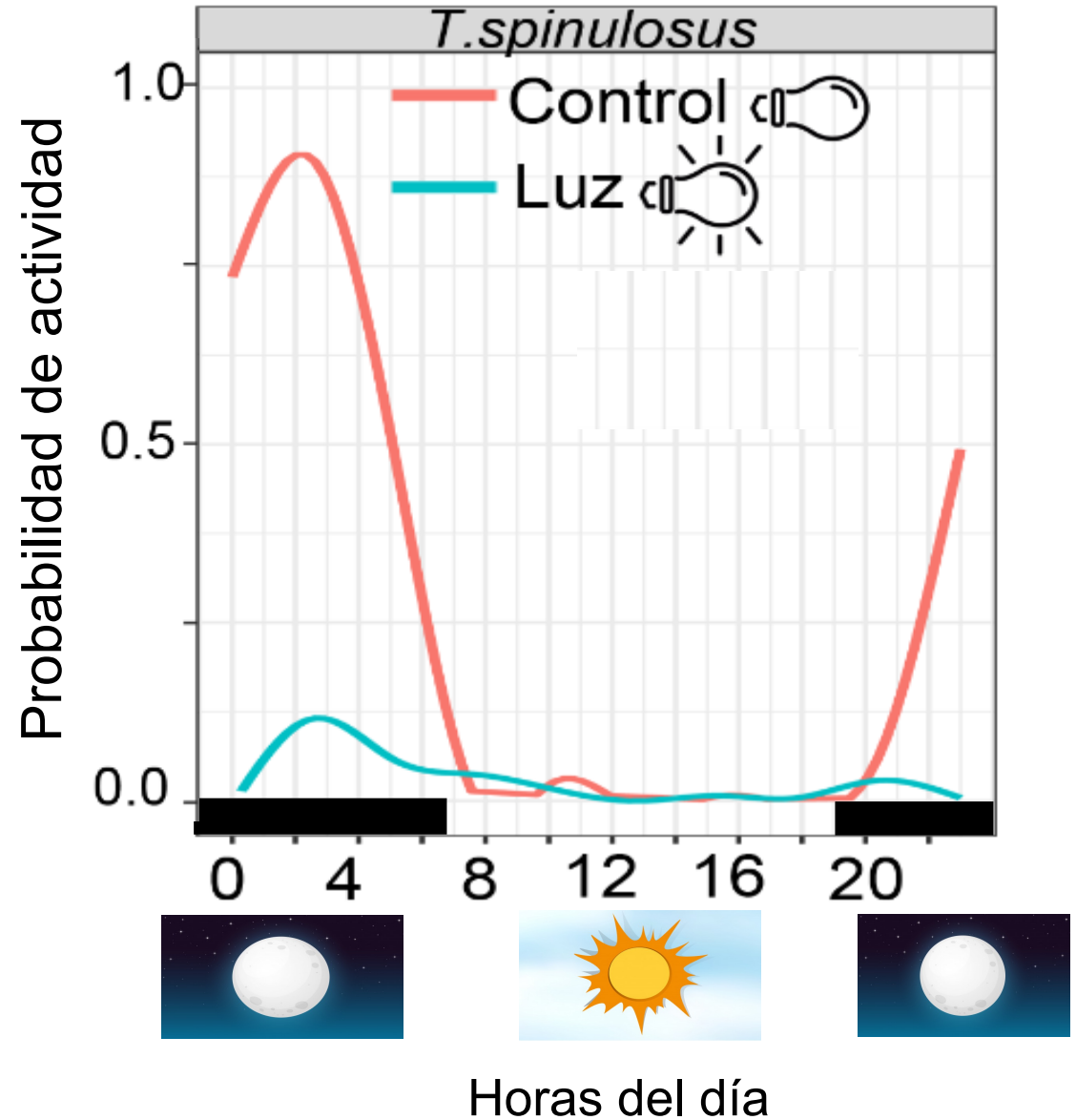


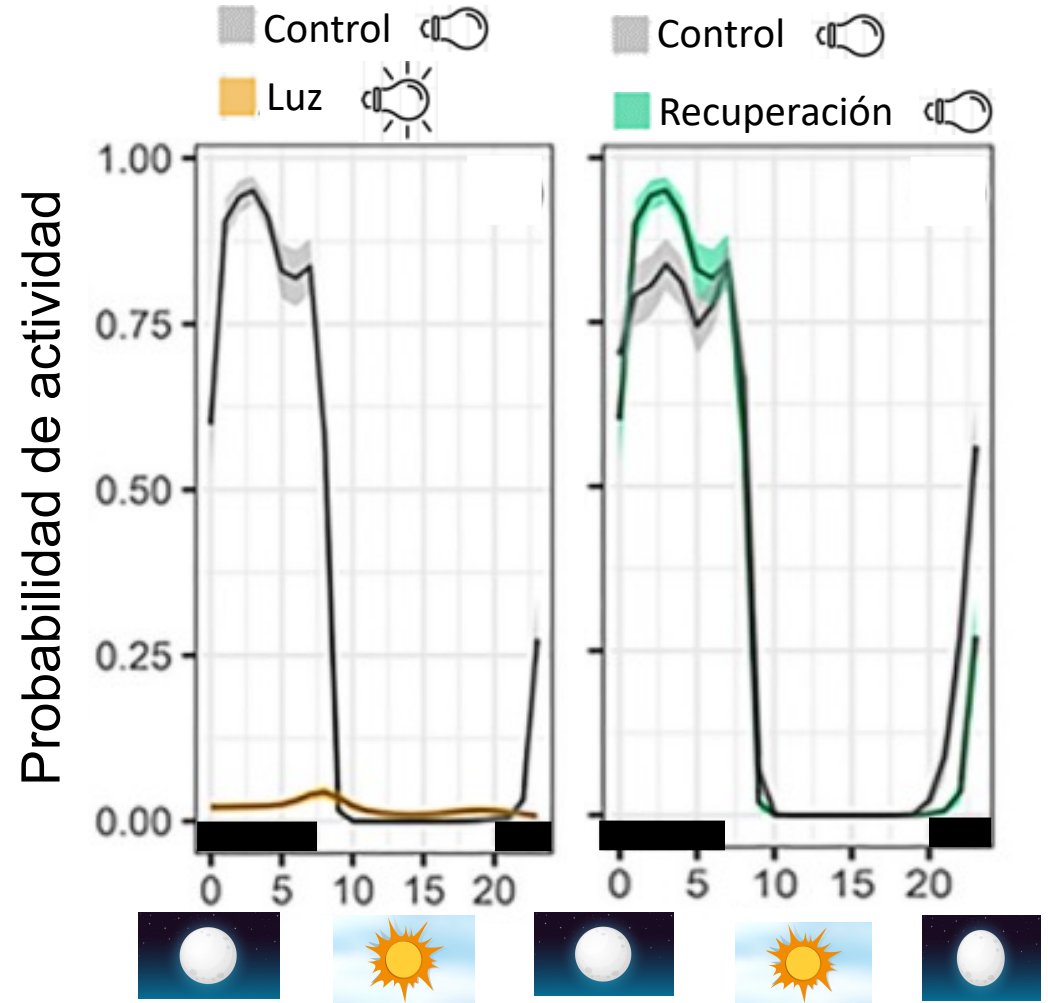
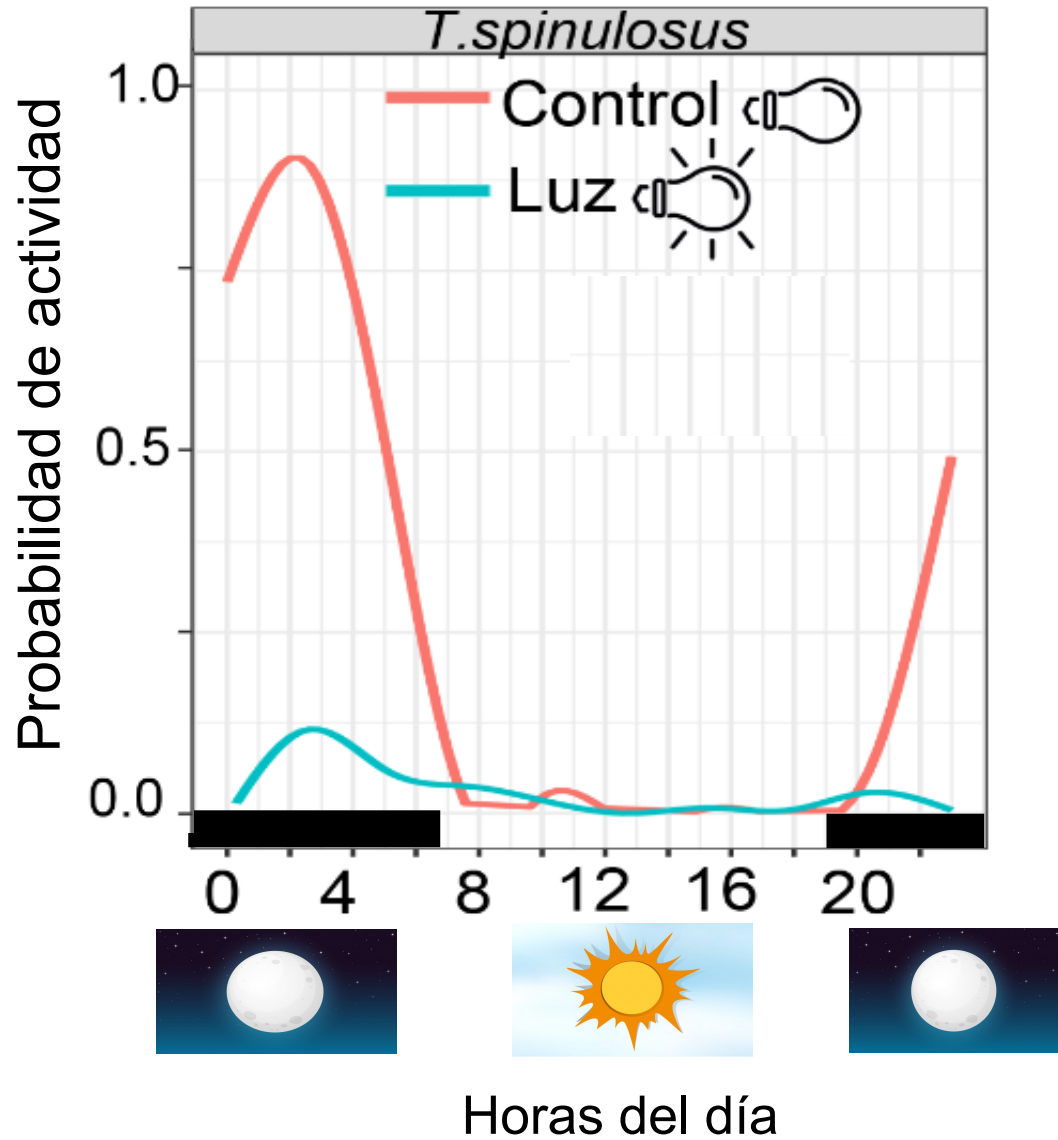
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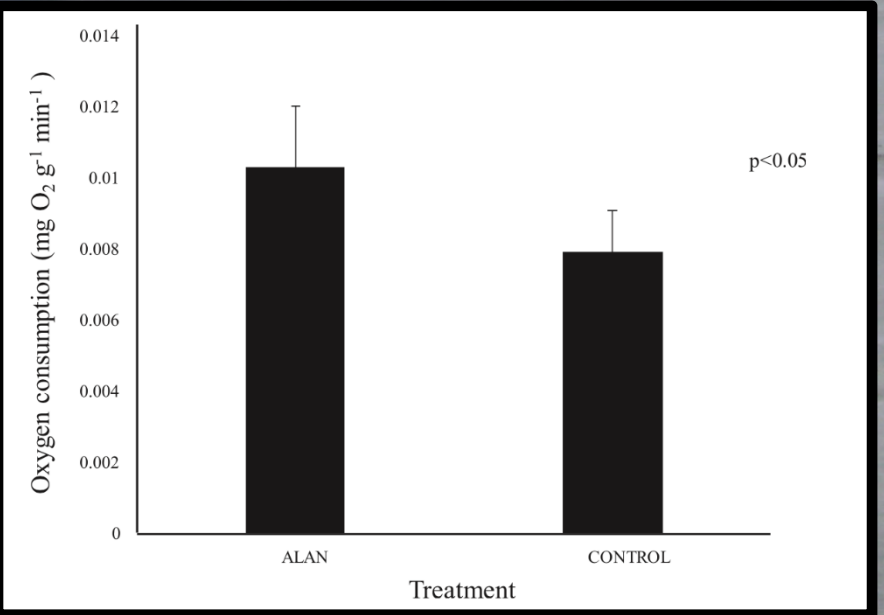
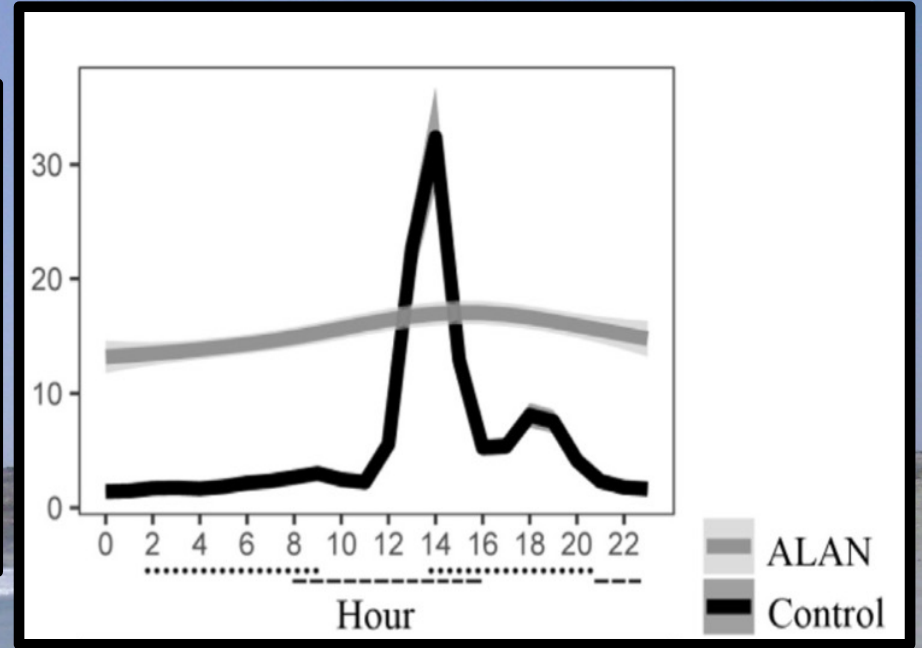


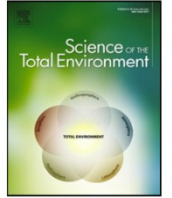
Endogenous cycles, activity patterns and energy expenditure of an intertidal fish is modified by artificial light pollution at night (ALAN)[☆]

José Pulgar ^{a,*}, Danae Zeballos ^a, Juan Vargas ^a, Marcela Aldana ^{b,c}, Patricio Manriquez ^{d,e}, Karen Manriquez ^{a,f}, Pedro A. Quijón ^g, Stephen Widdicombe ^h, Cristobal Anguita ^a, Diego Quintanilla ^a, Cristian Duarte ^{a,i}



Frequency of activity

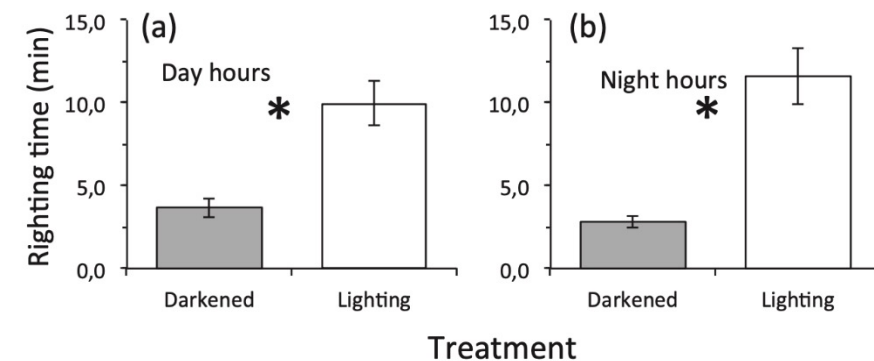
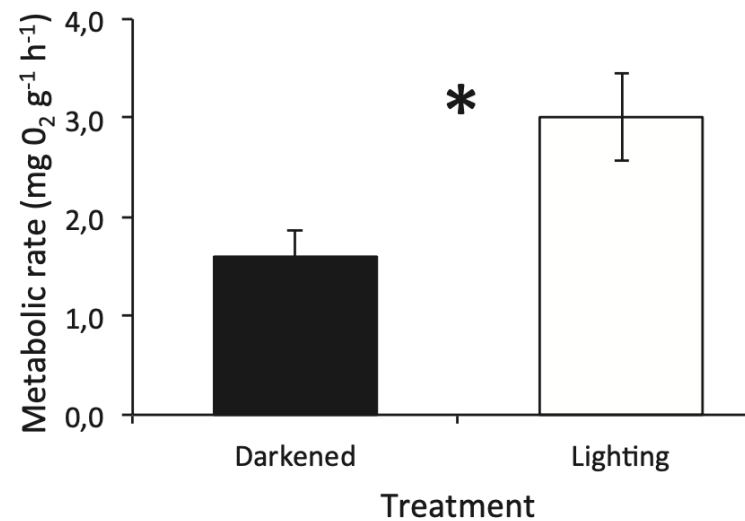




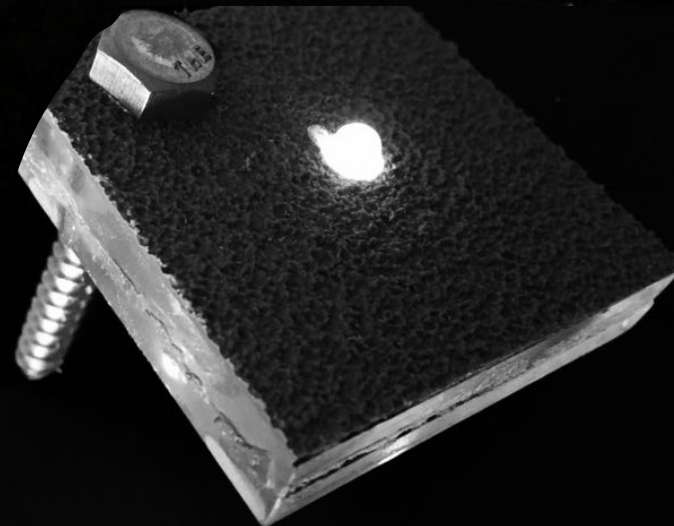
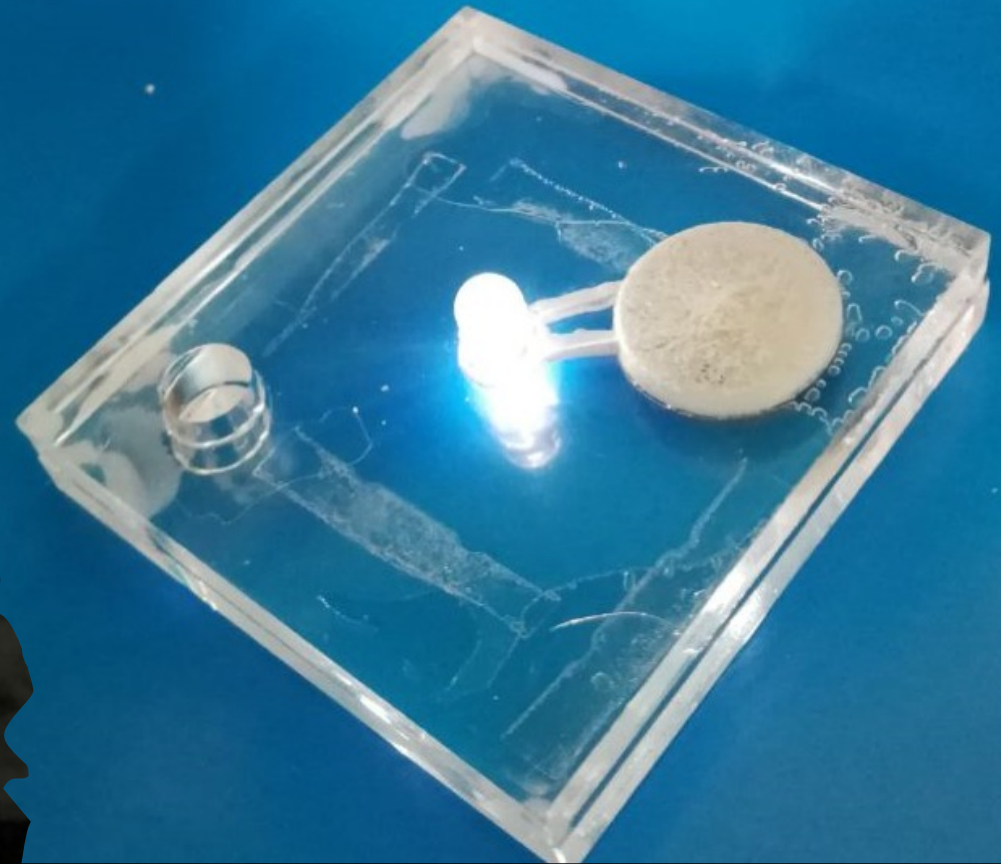
Artificial light pollution influences behavioral and physiological traits in a keystone predator species, *Concholepas concholepas*

Patricio H. Manríquez^{a,b,*}, María Elisa Jara^{a,b}, María Isabel Díaz^{a,b}, Pedro A. Quijón^c, Stephen Widdicombe^d, José Pulgar^e, Karen Manríquez^e, Diego Quintanilla-Ahumada^e, Cristian Duarte^e

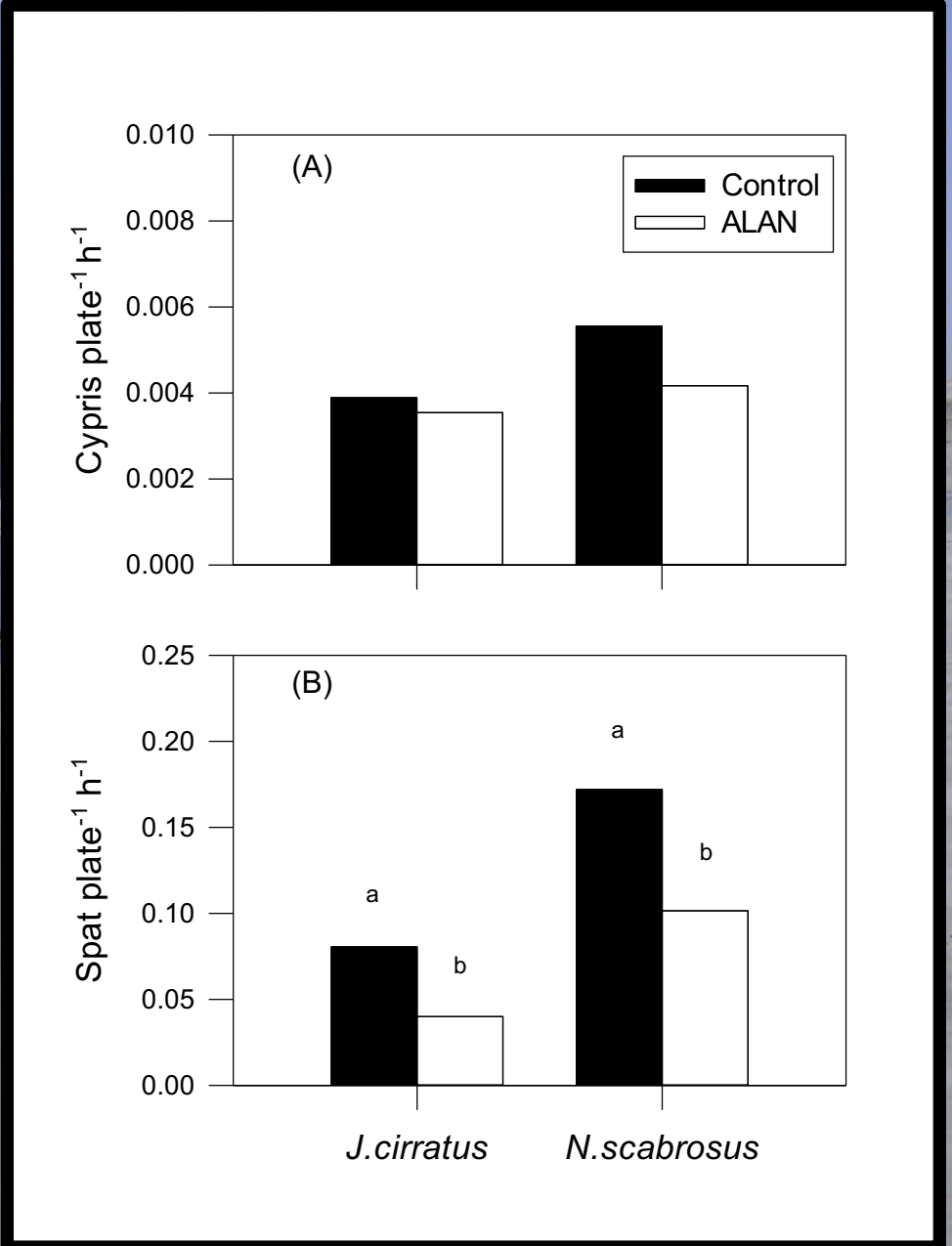
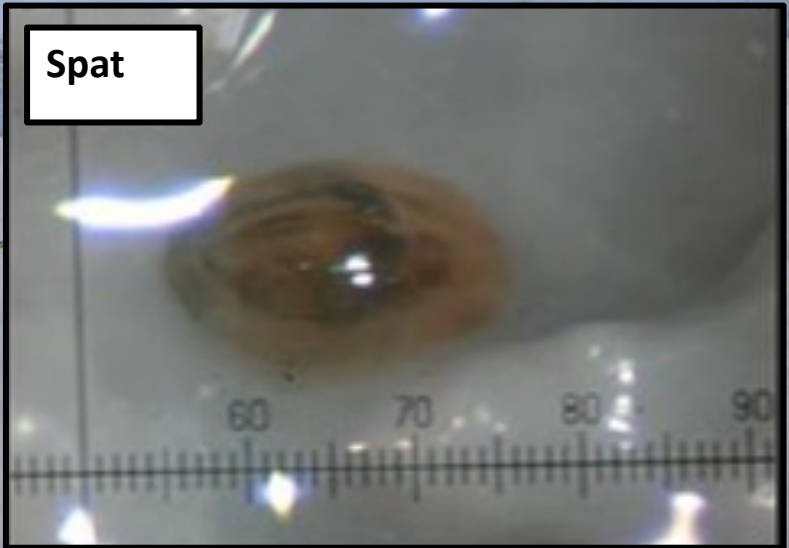
ALAN:
Antecedentes desde la costa de Chile



ALAN:
Antecedentes
desde la costa de
Chile



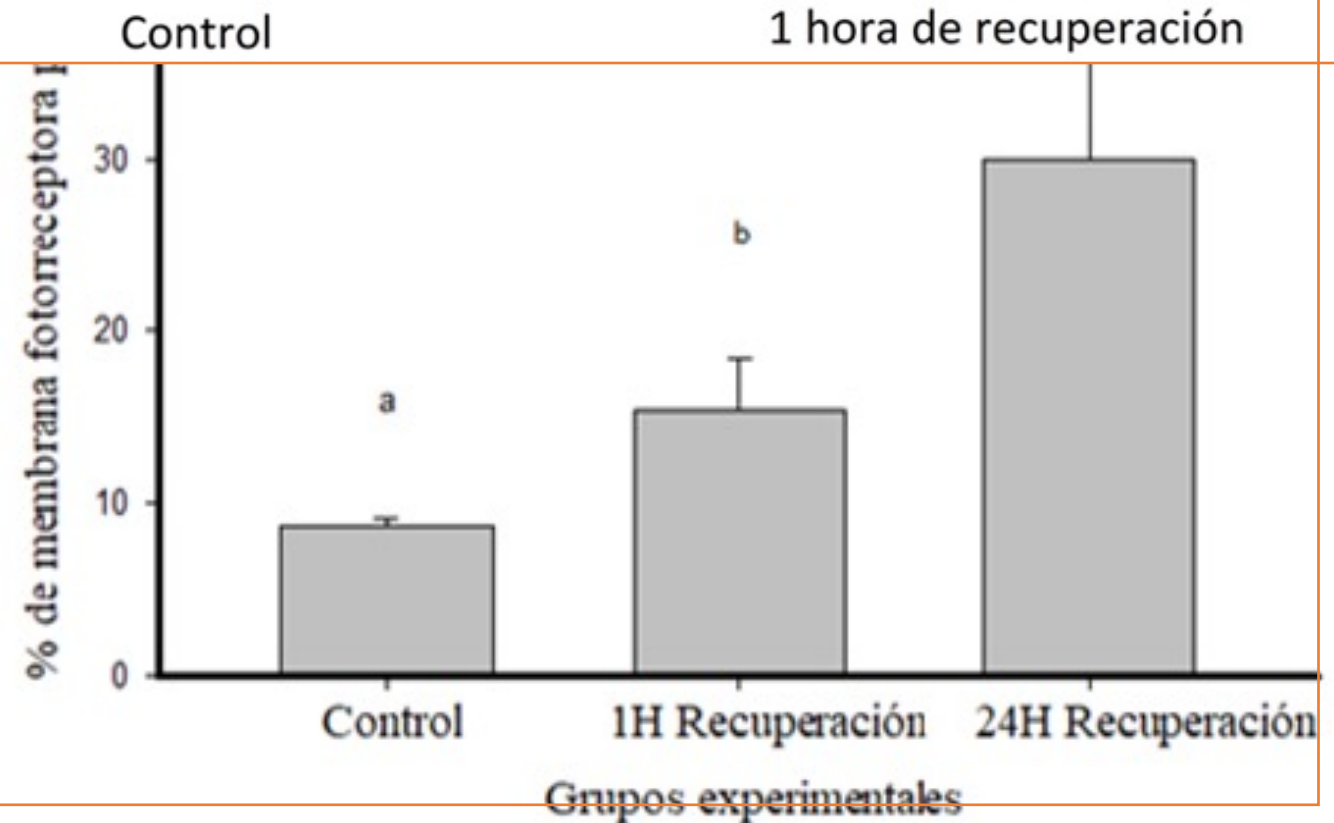
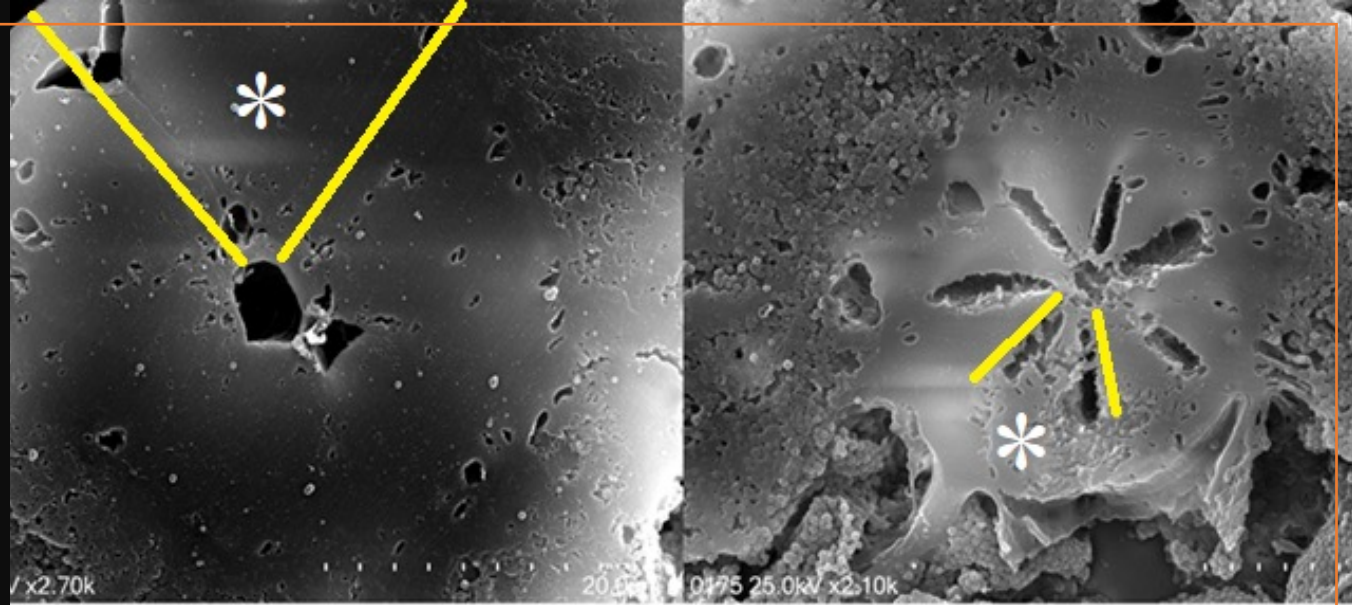
Chile



ALAN:
Antecedentes
desde la costa
de Chile



ALAN: Antecedentes desde la costa de Chile



Más allá de la
presencia de ALAN

ALAN: Antecedentes desde la costa de Chile

Distintas intensidades.

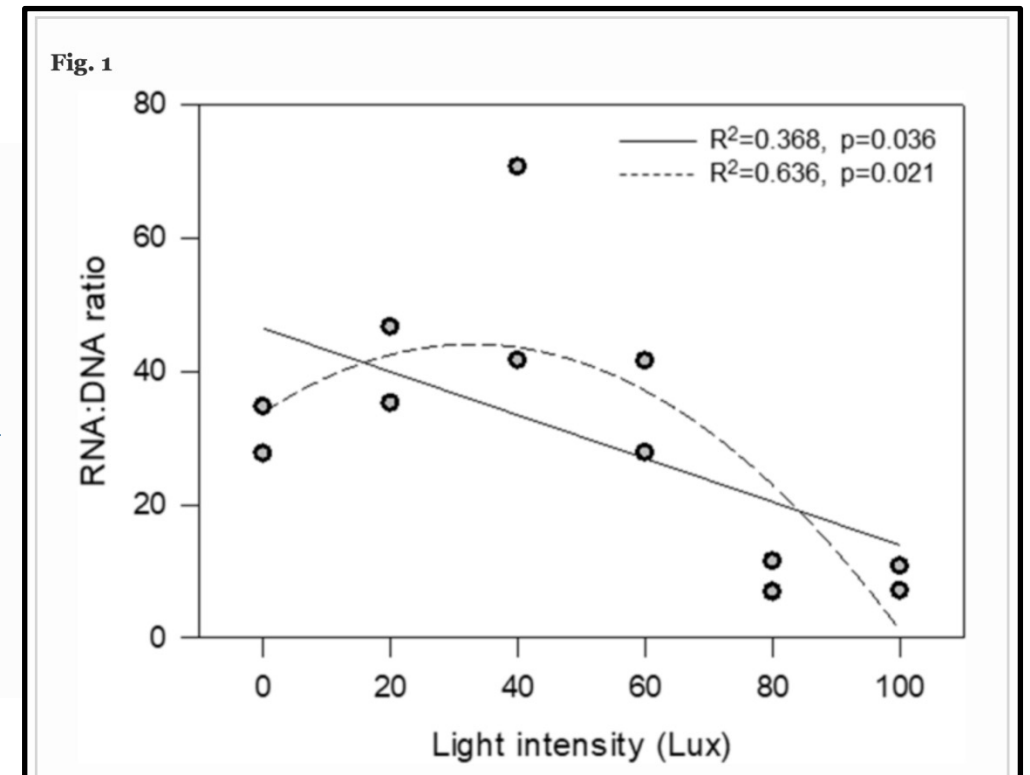
Research Article | [Published: 21 January 2022](#)

Artificial light at night (ALAN) causes variable dose-responses in a sandy beach isopod

[Diego Quintanilla-Ahumada](#), [Pedro A. Quijón](#), [Patricio H. Manríquez](#), [José Pulgar](#), [Manuel R. García-Huidobro](#), [Cristian Miranda](#), [Alfredo Molina](#), [Rodrigo Zuloaga](#) & [Cristian Duarte](#) ✉

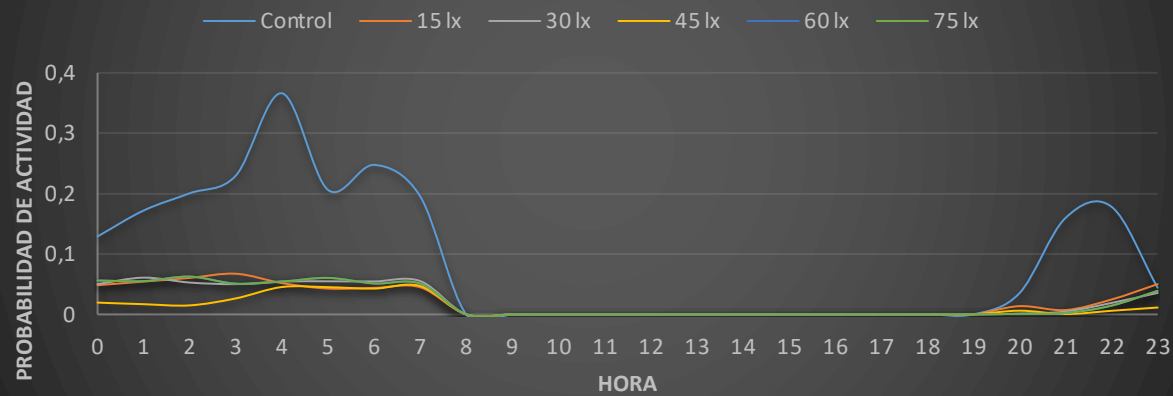
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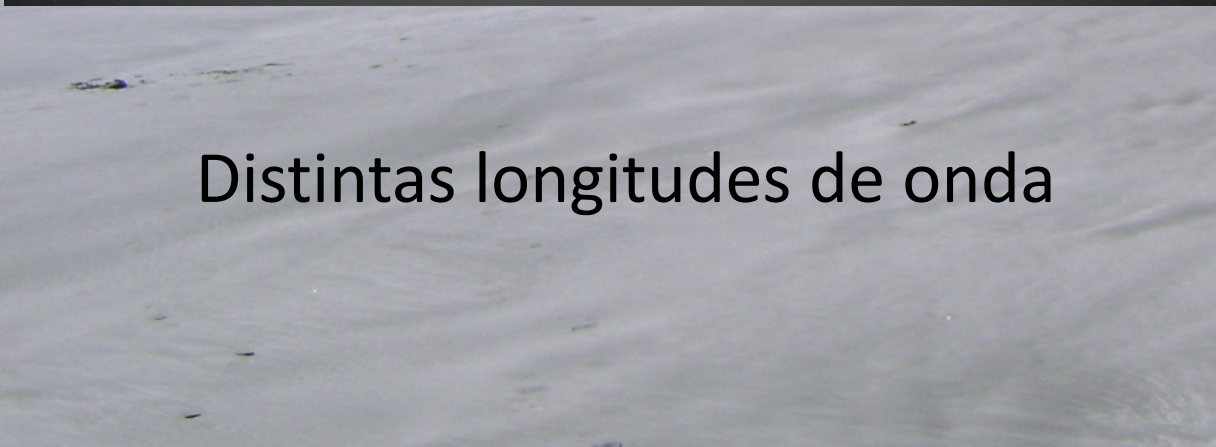
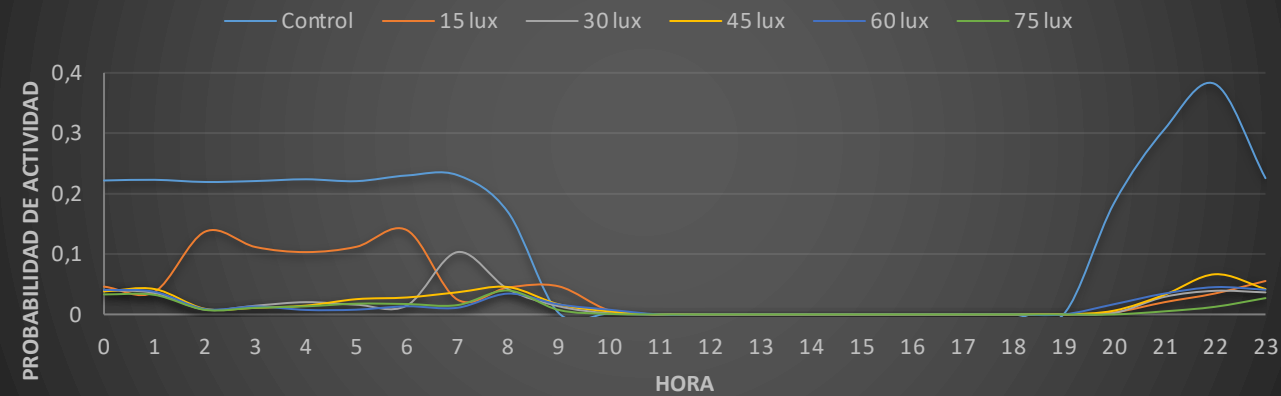


Distintas intensidades de luz blanca y tiempo de exposición.

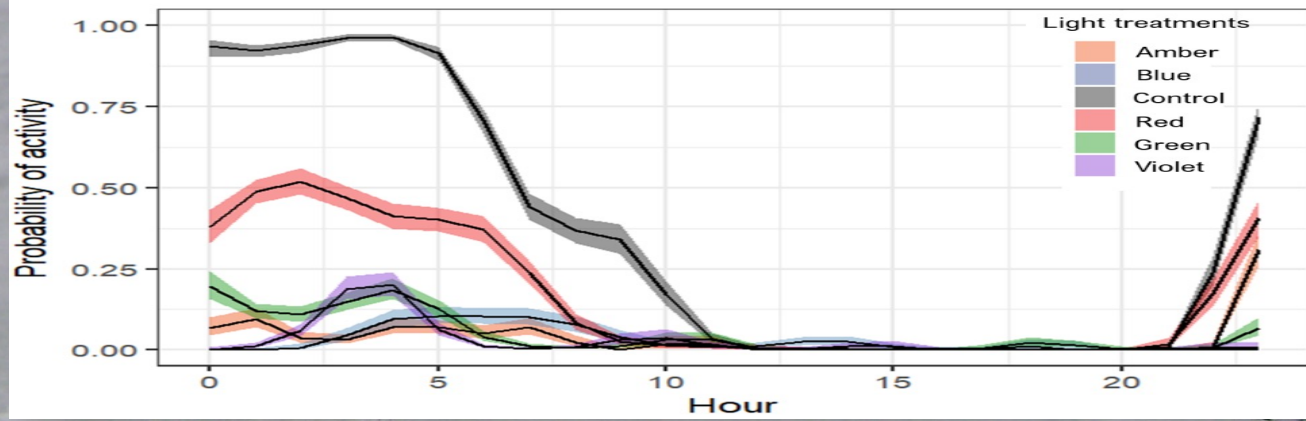
Exposición continua: Actividad locomotriz de *Orchestoidea tuberculata* adulto.



Exposición programada: Actividad Locomotriz *Orchestoidea tuberculata* adulto.

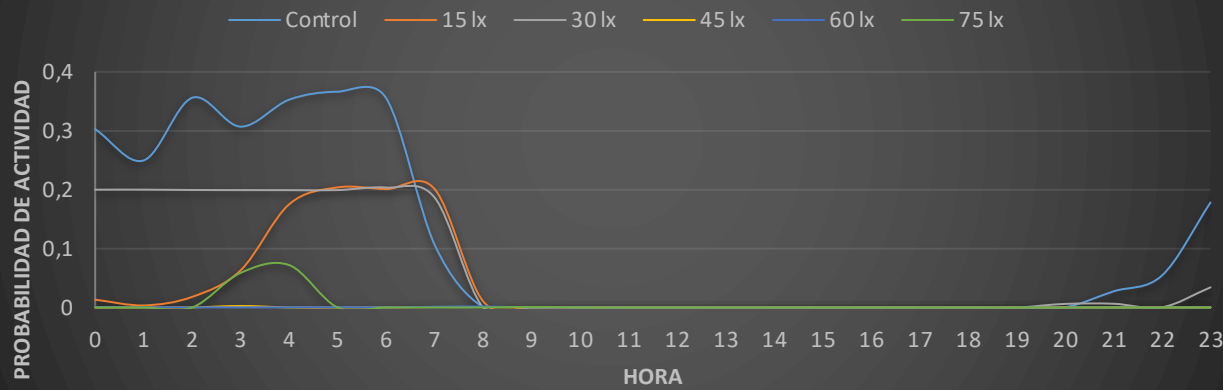


Distintas longitudes de onda

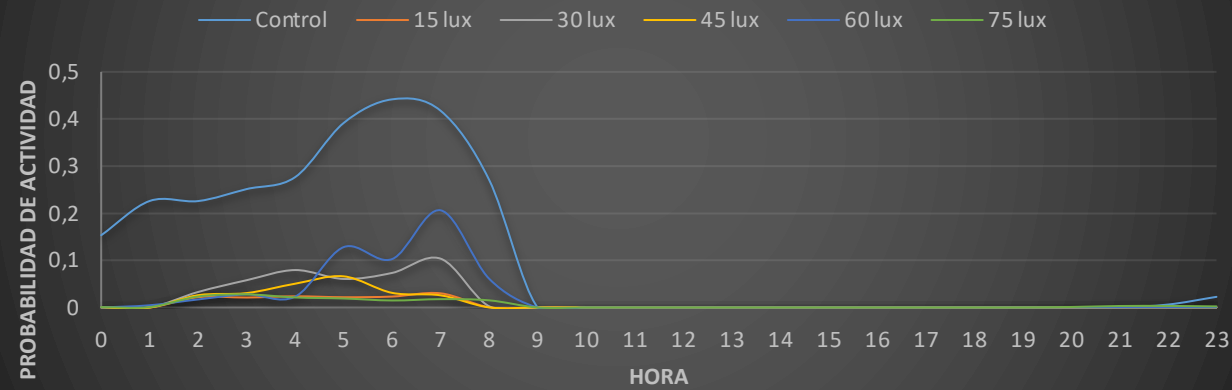


Distintas intensidades de luz blanca y tiempos de exposición

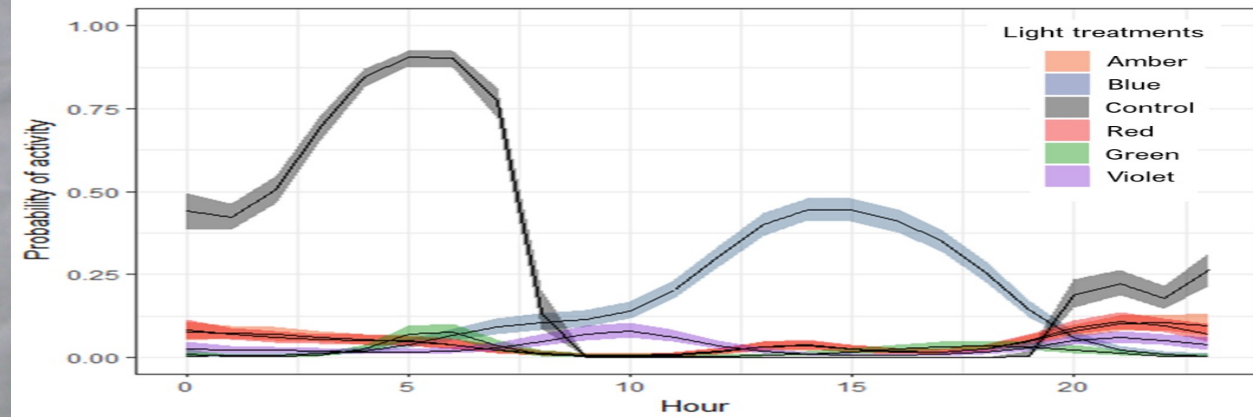
Exposición continua: Actividad locomotriz *Tylos spinulosus* adulto.



Exposición programada: Actividad Locomotriz *Tylos spinulosus* adulto.



Distintas longitudes de onda





ALAN: Antecedentes desde la costa de Chile



Otras medidas de
mitigación

Monitoreo Mundial de Contaminación Lumínica

GLOW – Global artificial Light Ocean netWork

The **Global artificial Light Ocean NetWork (GLOW)** is a collaborative network of scientists studying the potential effects of artificial light at night (ALAN) on coastal assemblages colonizing artificial structures. GLOW is conducting surveys to quantify the intensity and quality of night lightings and their effects on the abundance of intertidal algae and invertebrates.

Medidas de mitigación (Longcore et al., 2017)

- ¿Necesitamos luz?



Figure 16. A pale-colored path can be just as effective as electric lights in some park situations.

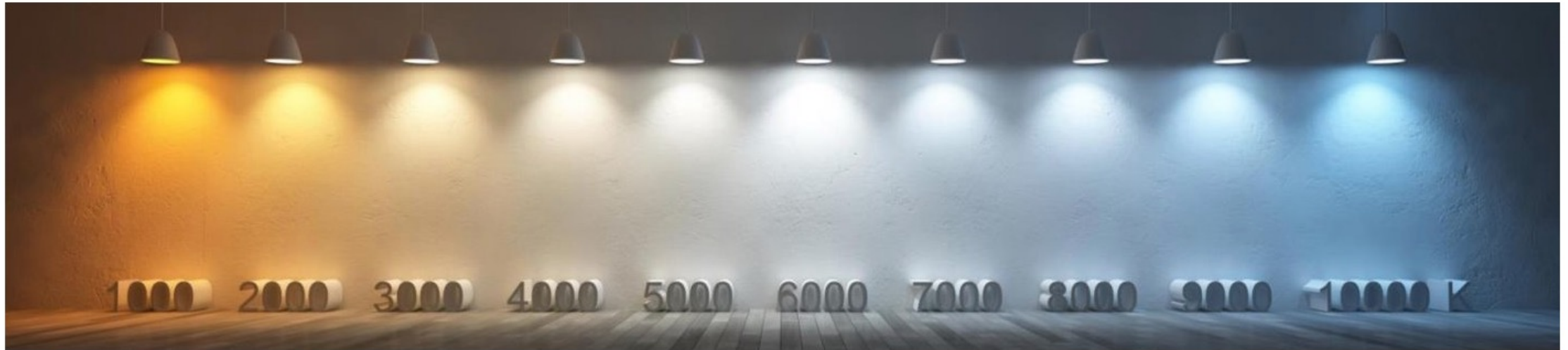
Medidas de mitigación (Longcore et al., 2017)

- Manejar la dirección luz



Figure 22. The more focused light can be on its target, the less it will affect other species.

Usar luces cálidas



Luz Cálida



Luz Fría



- Imagen: Ministerio del Medio Ambiente

*Tener una buena
norma que regule
la emisión.*

Folio N° 4111

REPÚBLICA DE CHILE
Ministerio del Medio
Ambiente

ESTABLECE NORMA DE EMISIÓN DE
LUMINOSIDAD ARTIFICIAL GENERADA POR
ALUMBRADOS DE EXTERIORES, ELABORADA
A PARTIR DE LA REVISIÓN DEL DECRETO
SUPREMO N°43, DE 2012, DEL MINISTERIO
DEL MEDIO AMBIENTE.

DECRETO SUPREMO N° 01

Rol de las luces LED en las medidas de mitigación



Disminuye CO₂



Espectro



Flexible



Agencia
Nacional de
Investigación
y Desarrollo

Ministerio de Ciencia,
Tecnología, Conocimiento
e Innovación

Gobierno de Chile

**MULTIPLE CHARACTERISTICS OF
ARTIFICIAL LIGHT POLLUTION AT NIGHT
(ALAN) AS DRIVERS OF CHANGE IN SANDY
BEACH ORGANISMS**

EQUIPO ALAN



Dr. José Pulgar



Dr. Patricio H. Manríquez



MSc. Diego Quintanilla



MSc. Nicole Jahnsen



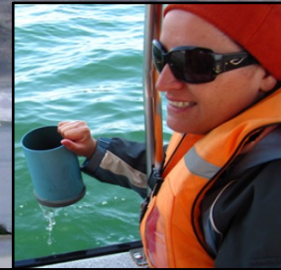
MSc. Nicol Zuñiga



Dr. (c) Cristian Miranda



Dr. (c) Diego Maturana



Dra. Karen Manríquez



Felipe Perez



Ing. Amb. Ailyne Ramos

Colaboradores internacionales



Dr. Pedro A. Quijon
UPEI Canadá



Dr. Stephen Widdicombe
Plymouth Marine Laboratory. UK



Dr. Thomas Davies
University of Plymouth. UK

