Conservations Javan Hawk Eagle (Nisaetus bartelsi) in Gunung Picis Ponorogo Nature Reserve

L Yuliamalia*, Sunarto† and T Utami†
†Environmental Science, Postgraduate, Sebelas Maret University, Central Java, 57126, Indonesia, ORCID ID 0000-0001-7208-9532

Abstract. The Javan Hawk Eagle (Nisaetus bartelsi) is a bird prey species (raptor) at the top of the food chain cycle that only exists in Java’s Island. Population the Javan Hawk Eagle is endangered due to illegal trade, poaching, and land narrowing. The purpose of this study is to know the population of the Javan Hawk Eagle in Gunung Picis Ponorogo Nature Reserve. The identification method used is by using the suitable method and direct observation. The study results explained that in the area, the Javan Hawk Eagle was found following food supplies in nature, so that area was very suitable for the breeding process of endemic birds in Java’s Island. In 2016, one young Javan Hawk-Eagle was released in this area. In 2017 and 2018, a young Javan Hawk-Eagle and 1 adult Javan Hawk-Eagle were found. Then at the end of 2019, they released one adult Javan Hawk-Eagle at location A, so there have been four adult Javan Hawk-Eagle. Observations lasted until 2020 in that area with the same result as in 2019. Observations made in that conservation area in February - March 2020 show that the Javan Hawk-Eagle conservation continues to increase, marked by the presence of young individuals.

1. Introduction

The Javan Hawk Eagles in biology language are Nisaetus bartelsi [22,24], which included in the top of predators group the foods chain cycles in forests ecosystem in Java. When there is a disturbance to Javan Hawk-Eagle, the food chains and webs in the ecosystem will also be disturbed. The Javan Hawk-Eagle is an endemic bird of prey in the island of Java whose population is increasingly threatened with extinction due to illegal trade, hunting, and narrowing of land [18].

The Javan Hawk Eagle (raptor) can make environmental indicators to maintain the balance of the natural forests ecosystem [17,19]. Raptor trade is widespread in almost every city in Indonesia [12] [13]. Although each diurnal raptor is protected by law [15], most of its trade occurs on the black market [11]. In 2015 there were 2471 diurnal raptor individuals offered through Facebook (FB) social media, and of them, there were 127 Javan Hawk Eagles [8,10].

The Javan Hawk-Eagle is included in the IUCN red list [4] and is one of the priorities of 66 endangered species by increasing the natural population by 10% from 2015 to 2019 [16]. Ways to increase the population can be done by natural reproduction or by human intervention through animal release programs from confiscated products or voluntary community submissions [5]. According to Gunawan [10], the release programs carried out include rehabilitation, habitation, and release of confiscated Javan Hawk Eagles, campaigns and public awareness, and conservation efforts for Javan Hawk Eagles.
The Javan Hawk-Eagle range is around 300 Ha [6]. Based on the calculations carried out by Syartinilia, et al. (2009), the population of Javan Hawk Eagles is around 325 pairs, and 117 pairs are scattered in West Java [2]. According to Van Balen [25] that the Javan Hawk-Eagle is spread in the forest area of West Java to the east. The conservation area of the Gunung Picis Nature Reserve is located in East Java, precisely in Ponorogo Regency. This conservation area is a natural habitat for birds of prey such as the Javan Hawk-Eagle (Nisaetus bartelsi), Black Eagle (Ictinaetus malayensis), and Crested Serpent Eagle (Spilornis cheela), so there is potential for the distribution and breeding of birds of prey.

The current research continues the existing research. Previous research [7] recorded three individual Javan Hawk Eagles in the Gunung Picis Nature Reserve. The Gunung Picis Nature Reserve itself is a conservation area established based on the Decree of the Governor-General of the Dutch East Indies Number: 23 Stbl 471 dated September 4, 1936 and Ministry of Environment and Forestry Number: SK.417/Kpts-II/1999 and has been updated through SK Number: SK.395/Menhut-II/2011 dated July 21, 2011 concerning Designation of Forest and Water Areas in East Java Province and is one of the natural habitats of the Javan Hawk-Eagle in Ponorogo [1]. The recording of young individuals is one indicator of the success of Javan Hawk Eagles populations growth naturally, so it is essential to continue research to monitor the conservation Javan Hawk Eagles in the Gunung Picis Ponorogo Nature Reserve area.

2. Methods
The method explains the description of the time and location of the research. The time and location are chosen due to the research need considering all resistance data accessibility, available time, and budget. The method also explains the data collections and analysis.

2.1. Time and Location the Research
This research was conducted in February – March 2020 in the Gunung Picis Nature Reserve, located in Gondowido, Ngebel, Ponorogo, East Java, with an area of 27.90 Ha. Geographically, it is located at 07°44′20″-07°45′41″ South Latitude and 111°39′12″-111°39′44″ East Longitude with the northern boundary being the pine production forest of PT Perhutani and Pupus Village, the southern boundary being the Pine production forest PT Perhutani, the west boundary is PT Perhutani's pine production forest and Gondowido Village, and the east boundary is PT Perhutani's pine production forest (figure 1).

Figure 1. Map of the Gunung Picis Ponorogo Nature Reserve Area
Source: BBKSDA East Java
2.2. Data Collection and Analysis
The Gunung Picis Nature Reserve area has a hilly topography with moderate to steep slopes with altitude ± 1200 meters above sea level and a track length of 7.2 km, with a total of 196 pal boundaries. Gunung Picis Ponorogo Nature Reserve is 2582 mm/year with an average rainy day of 142 days. The temperature in that area ranges from 15 to 20°C at night and 30 to 35°C during the day, and the vegetation type is mountainous tropical rain forest [21].

The method used in this research is the cooperative method and direct observation [23]. In addition to these methods, the methods used the line transect and point count methods to count animals in the conservation area other than birds of prey. The cooperative method is carried out by taking research data outside the area due to weather conditions and dense canopy conditions so that it is impossible to observe the daily activities of the Javan Hawk-Eagle. Direct observation was carried out by placing six researchers and three officers at three points (figure 5) on the same object. Every two researchers and one BBKSDA officer of Region 1 Madiun who are at each point to observe and record in detail the observed objects by communicating with each other using a handy talky (HT). Each stage observation was recorded for the number, age, and location of Javan Hawk-Eagle’s encounter in the observation worksheet. In addition to these two methods, data is collected annually with officers working at the Javan Hawk-Eagle observation site (figure 5). The identification process is carried out by matching birds’ morphological, topographical, taxonomic, and behavioral characteristics using the Birds Field Guidebook in Sumatra, Java, Bali, and Kalimantan [14]. How to distinguish them by matching the morphological, topographical, taxonomic, and behavioral characteristics of birds using a field guidebook for birds of prey in the BBKSDA conservation area of East Java [3]. The Gunung Picis Nature Reserve area contains several species of birds, mammals, herpetofauna, and insects. This is following observations made by researchers using transect line and point count methods.

3. Results And Discussion
The Javan Hawk-Eagle has a classification: Kingdom Animalia, Phylum Chordata, Class Aves, Order Accipitriformes, Family Accipitridae, Genus Nisaetus, Species Nisaetus bartelsi [22,24]. Javan Hawk-Eagle lives from the lowlands to an altitude of 3000 meters above sea level [14]. According to Rov, et al., [20], this species likes areas with an altitude of 200 – 2000 masl. The results of the study explain that the Javan Hawk-Eagle encounters at an altitude of 800 meters above sea level (locations A and B figure 5) when Javan Hawk-Eagle is perched on Pasang tree (Quercus sp.) (figure 4).

According to Gunawan et al. [9], the results of annual monitoring from 2013 to 2018, the natural population of Javan Hawk-Eagle in the Gunung Picis Nature Reserve has been distributed in 3 (three) locations (figure 5). The age difference between Javan Hawk-Eagle is marked by the color of the feathers. The young Javan Hawk-Eagle has white fur and does not have a crest, while the adult Javan Hawk Eagle has brown fur and already has a crest on its head (figure 2 and figure 3). The locations of the encounters of Javan Hawk Eagles were found stages as shown in Table 1.
Table 1. Conservation Javan Hawk Eagles in Gunung Picis Ponorogo Nature Reserve

| Javan Hawk-Eagle Population Distribution | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------------------------------------|------|------|------|------|------|------|------|------|
| Location                                | A    | A    | B    | A    | B    | A    | B    | A    |
| Child/Juvenile                          | 1    | 1    | -    | 1    | -    | 1    | 1    | -    |
| Adult                                   | 2    | -    | 2    | -    | 2    | -    | 1    | -    |
| Population                              | 3    | 1    | 2    | -    | 3    | -    | 1    | 2    |

Figure 5. Javan Hawk-Eagle Population Distribution

Sources: BBKSDA East Java

Table 1 in 2013 the Javan Hawk-Eagle in the Gunung Picis Nature Reserve area and routine observations were carried out until 2018. The number of Javan Hawk-Eagle found at location A was 3 individuals, consisting of 2 adults and 1 juvenile. Location A is close to a spring for the needs of flora and fauna.

In 2014, 1 juvenile individual was successfully recorded by researchers at the exact location as in 2013. A pair of adult Javan Hawk-Eagle at are also location B, which is 1 km away. Location B is near the river. The result of the observation is that the Javan Hawk-Eagle has a different roaming area.

In 2015, the Javan Hawk-Eagle in the first location (location A) was not recorded, but recorded three Javan Hawk-Eagle consisting of 2 adults and one juvenile whose age is estimated to be younger (figure 2) than the previous juvenile Javan Hawk-Eagle in location B. It is estimated that the three individuals are one family.

In 2016, release 1 juvenile Javan Hawk-Eagle was carried out in location hoping that each individual in the location met each other and paired up. Location C is the location of the springs. The released Javan Hawk-Eagle shifted towards the village and was caught by the community on the 35th day after the release. This year 2 adults and 1 juvenile were found in location B, it is estimated that these juveniles were puppies encountered in 2015.

According to Gunawan, et al. [9], the Javan Hawk-Eagle breeds every 2-3 years, and in 2017 1 adult Javan Hawk-Eagle recorded at location B. Then observations were continued in 2018, which recorded 1 adult Javan Hawk-Eagle at location A, and at location B found 1 young Javan Hawk-Eagle and 1 adult Javan Hawk-Eagle. It is estimated that the observed young Javan Hawk Eagle was new chicks that hatched in 2018 [9]. Then at the end of 2019 the release of 1 adult Javan Hawk-Eagle at location A, so that 2 adult Javan Hawk-Eagle were recorded at location A and 2 adult Javan Hawk-Eagle at location B. Observations lasted until 2020 in the Gunung Picis Ponorogo Nature Reserve with the same result as in 2019.
The study results explain that the Gunung Picis Nature Reserve area can survive and breed the Javan Hawk-Eagle. This can be seen by considering more than 3 Javan Hawk Eagles living in that area. Besides Javan Hawk Eagles, there are Black Eagles and Crested Serpent Eagles as birds of prey that live in the area. Biodiversity in the Gunung Picis Nature Reserve area is still well maintained so that the conservation area becomes a suitable habitat for the Javan Hawk-Eagle. Biodiversity is still good, as evidenced by the large number of faunas found in the conservation area. The value of the Diversity Index in the Gunung Picis Nature Reserve shows a Medium Diversity Index, which is $H' = 1.648387008$. Based on the criteria proposed by Shannon-Wiener, namely $H' < 1$ Low category, $H' = 1-3$ Medium category, and $H' > 3$ High category. In addition, the density of flora where the Javan Hawk-Eagle does its daily activities, such as making nests, perching, soaring to get food, and looking for partners to breed naturally, is also well maintained. The food chain, in the Gunung Picis Nature Reserve continues to this day. Therefore, in the food chain there are species of birds, mammals, herpetofauna, and insects, and biodiversity is continuously related.

The Javan Hawk-Eagle’s diet consists of small birds, partridges, squirrels, nettles, rats, and others. The researcher found the Javan Kingfisher feathers (figure 6) scattered around the location of the Javan Hawk-Eagle perching (figure 4). This proves that the Javan Hawk-Eagle also eats birds that are smaller in size.

**Figure 6.** The Javan Kingfisher feathers (Javan Hawk Eagle Food)

### 4. Conclusions And Suggestions

Observations made in the conservation area of the Gunung Picis Nature Reserve in February - March 2020 showed that the conservation of the Javan Hawk-Eagle continued to increase, which was marked by the presence of young individuals. Biodiversity in the Gunung Picis Nature Reserve area is still well maintained so that the conservation area becomes a suitable habitat for the Javan Hawk-Eagle. This research has obstacles, including steep terrain, the observation of Javan Hawk-Eagle being blocked by the canopy, and the rainy weather that often changes.

In order to know the development of Javan Hawk-Eagle populations and availability of food, as well as animal encounters in the Gunung Picis Nature Reserve area, it is necessary to:

1. Continuous monitoring activities to monitor the breeding of the Javan Hawk Eagle.
2. Data collection on flora and fauna ensures that the habitat is still good enough for the Javan Hawk Eagle to breed.
3. Efforts to protect the breeding of the Javan Hawk-Eagle from threatening disturbances.

### Acknowledgements

Thanks, and appreciation are addressed to the East Java BBKSDA and all staff who have been granted research permits in the conservation area of the Gunung Picis Ponorogo Nature Reserve. Dr. Sunarto, M.S. and Dr. Trisni Utami, M.Sc., who has given time always to guide me, fellow researchers who took the time to collect data in the field, the community around CA Gunung Picis, and those who have helped with this research.
References

[1] Aji, F.D.N., Gunawan, Asman A.A., Resia H., dan Adi A.P., 2016. Laporan Pelepasliaran Elang Jawa (Nisaetus bartelsi) Hasil Sitaan ke Habitat Alaminya di Cagar Alam Gunung Picis, Ponorogo-Jawa Timur.

[2] Azmi, N., Syartitini, dan Y.A. Mulyani (2016). Model Distribusi Spasial Habitat Elang Jawa (Nisaetus bartelsi) yang Tersisa di Jawa Barat. Media Konservasi, 21 (1): 9-18.

[3] Balai Besar Konservasi Sumber Daya Alam (BBKSDA) Jawa Timur, 2013. Panduan Lapang Burung Pemangsa di Kawasan Konservasi. Surabaya 2013.

[4] Bird Life International (2018). The IUCN Red List of Threatened Species. Version 2018.3.

[5] Fajar, D.N.A., Tri W.W., Gunawan, Rully M., Sigit T., and Eddy K. (2019). Javan Hawk-Eagle Release Program in Gunung Sigogor and Gunung Picis Nature Reserve, East Java. Jurnal Metamorfosa, 6 (2): 237-243, September 2019.

[6] Gjershaung, J.O., Røv N., Nygard T., Prawiradilaga D.M., Afianto M.Y., Hapsoro M.Y., and Supriatna A. (2004). Home-range size of the Javan Hawk-Eagle (Spizaetus bartelsi) estimated from direct observations and radiotelemetry. Journal of Raptor Research, 38: 343-349.

[7] Gunawan, Ahmad P., and Ricard N. (2017). The Use of Social Media in the Illegal Trade in Indonesian Raptors. Kukila, 20: 1-10.

[8] Gunawan, Nani, R., Fauzia, Zulham, Djmaludin, H. Pramono, dan A. Yuniar (2016). New Homes on Misty Mountains: Javan Hawk-Eagle (Nisaetus bartelsi) and Changeable Hawk-Eagle (Nisaetus cirrhatus) Nesting in Gunung Halimun Salak National Park, West Java, Indonesia. Podoces 11: 1-6.

[9] Gunawan, Tri W.W., Fajar D.N.A., Imran J., and Danafia P. (2020). Population Dynamics of Javan Hawk-Eagle (Nisaetus bartelsi) in Gunung Picis and Gunung Sigogor Nature Reserve Areas. Simbiosis, 8 (1): 9-16, Maret 2020.

[10] Gunawan, Zulham, Hendry P., Djmaludin, Annisa Y., Kanthi H., Sri M., Kuswando, and Ika K. (2017). Release of Confiscated Raptors in Indonesia by Suaka Elang (Raptor Sanctuary): Protocols and Progress to Date. BirdingASIA 27 88-93.

[11] Haryanta, Agus, Nugroho, D., dan Hardianto, N. (2011). Pendataan dan Pengenalaman Jenis Satwa liar di Pasar Burung yang Sering Diperdagangkan. Bogor: Wildlife Conservation Society.

[12] Iqbal, M. (2015). Looking at Online Bird Trading in Indonesia; a Case Study From South Sumatra. BirdingASIA 24 132-135.

[13] Iqbal, M. (2016). Predators Become Prey! Can Indonesian Raptors Survive Online Bird Trading? BirdingASIA 25 30-35.

[14] MacKinnon, J., Phillipps, K., and Balen, S. Van. (1998). Burung-burung di Sumatera, Jawa, Bali, dan Kalimantan (termasuk Sabah, Sarawak, dan Brunei Darussalam). Puslitbang Biologi-LIPI Jakarta.

[15] Noerdjito, M., dan Maryanto, I. (2001). Jenis-jenis Hayati yang Dilindungi Perundang-undangan Indonesia. Cibinong, Indonesia: Museum Zoologi cum Bogoriense, LIPI, The Nature Conservancy and USAID.

[16] Peraturan Menteri Kehutanan Republik Indonesia Nomor: P.58/Menhut-II/2013 Tentang Strategi dan Rencana Aksi Konservasi Elang Jawa (Spizaetus bartelsi) Tahun 2013-2022.

[17] Poirazidis, K., Goutner V., Tsachalidis E., and Kati V. (2007). Comparison of Nest-Site Selection Patterns of Different Sympatric Raptor Species as a Tool for Their Conservation. Animal Biodiversity and Conservation, 30 131-145.

[18] Prawiradilaga, D.M. (1999). Elang Jawa: Satwa Langka. Seri Pendidikan Konservasi Keanekaragaman Hayati. Bogor: Biodiversity Conservation Project, P3B-LIPI/JICA-PKA/DEPHUTBUN.

[19] Rodriguez-Estrella, R., Donazar, J.A., and Hiraldo, F. (1998). Raptors as Indicators of Environmental Change in the Scrub Habitat of Baja California Sur, Mexico. Conserv. Biol. 12 921-925.
[20] Røv, N., Gjershaung, J.O., Prawiradilaga, D.M., Hapsoro, and Supriatna, A.A. (1997). Conservation Biology of the Javan Hawk-Eagle. Progress Report Prepared for the Indonesian Institute of Sciences (LIPI) and the Ministry of State for Environment (LH), Bogor, Indonesia.

[21] Setyawati, T. (2010). Pemanfaatan Pohon Berkhasiat Obat di Cagar Alam Gunung Picis dan Gunung Sigogor, Kabupaten Ponorogo, Jawa Timur. Penelitian Hutan dan Konservasi Alam 7 (2): 177-192.

[22] Sözer, R. dan V. Nijman., 1995. Behavioural ecology, distribution and conservation of the Javan Hawk-Eagle Spizaetus bartelsi Stresemann, 1924. Verslagen en Technische Gegevens. 62 1-122.

[23] Sugiyono, 2014. Metode Penelitian Kombinasi (Mixed Methods). Penerbit: CV. Alfabeta, Cetakan Ke-5, Februari 2014, Bandung.

[24] Syartinilia, Tsuyuki S., and Lee JS. (2009). A Habitat Model for the Javan Hawk-Eagle (Spizaetus bartelsi) using Multi-Scale Approach in Java Island, Indonesia. Wildlife: Destruction, Conservation and Biodiversity, 9 301-312.

[25] Van Balen, B. (1999). Birds of Fragmented Islands: Persistence in the Forests of Java and Bali. Doctoral Thesis. Wageningen University and Research Centre, The Netherlands.